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Implementing Residual Income Valuation With Linear Information Dynamics

James N. Myers
University of Washington

ABSTRACT: Residual income (RI) valuation is a method of estimating firm value based on expected future accounting numbers. This study documents the necessity of using linear information models (LIMs) of the time series of accounting numbers in valuation. I find that recent studies that make *ad hoc* modifications to the LIMs contain internal inconsistencies and violate the no arbitrage assumption. I outline a method for modifying the LIMs while preserving internal consistency. I also find that when estimated as a time series, the LIMs of Ohlson (1995), and Feltham and Ohlson (1995) provide value estimates no better than book value alone. By comparing the implied price coefficients to coefficients from a price level regression, I find that the models imply inefficient weightings on the accounting numbers. Furthermore, the median conservatism parameter of Feltham and Ohlson (1995) is significantly negative, contrary to the model's prediction, for even the most conservative firms. To explain these failures, I estimate a LIM from a more carefully modeled accounting system that provides two parameters of conservatism (the income parameter and the book value parameter). However, this model also fails to capture the true stochastic relationship among accounting variables. More complex models tend to provide noisier estimates of firm value than more parsimonious models.

Key Words: *Residual income, Valuation, Linear information dynamics, Conservatism.*

Data Availability: *Data are available from sources indicated in the text.*

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I. INTRODUCTION

To relate firm value and accounting earnings, there must be a link between earnings and dividends. Until recently, researchers have assumed either a proportional payout of earnings or a monotonic relationship between earnings and dividends. Assuming only clean surplus accounting, Ohlson (1995) shows that a firm's "intrinsic" value is equal to the book value of equity plus the present value of expected future residual income.[1,2] Residual income (RI) is the difference between accounting earnings and a charge for the normal return on equity (the discount rate times book value). "Intrinsic" value equals the present value of expected future dividends regardless of the dividend payout policy or the quality of the accounting numbers, providing that clean surplus is observed. RI valuation models firm value as a function of current and expected future accounting numbers. This is appealing because the necessary link between firm value and earnings, book value and dividends is inherent in the accounting system.

However, the clean surplus link between dividends, book value and earnings is not sufficient to implement RI valuation. As Bernard (1994) states, a second link between current accounting numbers and future RI is an essential part of fundamental analysis. This link is the information dynamics (Ohlson 1995).

The information dynamics used by Ohlson (1995) (the Linear Information Model or LIM) is an autoregressive model of RI. Recent empirical research in RI valuation attempts to implement valuation by modifying the LIM (e.g., Frankel and Lee 1998) or by adding other information to the LIM (e.g., Dechow et al. 1998). These modifications can create internal inconsistencies. This is troubling because one common motivation for using the RI valuation model is that it "provides a theoretical basis for specifying the relation between equity value and accounting information" (Dechow et al. 1998, 1). The importance of these internal inconsistencies depends on one's perspective. From a purely pragmatic point of view, theory may be irrelevant and the proof of the model is in how well it estimates abnormal stock market returns or how well it approximates stock prices. However, given this perspective, it is unclear why theory is used to motivate these studies. Alternatively, if this line of research seeks to advance the state of knowledge about the theory of firm valuation, then the minimum criterion should be that the underlying theory is internally consistent.

In this study, I first document the pitfalls of straying from linear models of the information dynamics. I then estimate four linear models of the information dynamics proposed by theory and find that the autoregressive model of RI (Ohlson 1995) explains cross-sectional variation in price only as well as book value alone. The two models that incorporate the influence of accounting conservatism on the information dynamics (based on Feltham and Ohlson [1995, 1996]) meet with mixed success. Consistent with theory, I find that accounting conservatism systematically influences the information dynamics. Nonetheless, I find that the models of conservatism's effect on the accounting series are inadequate. While accounting-based empirical estimates of the conservatism parameters in Feltham and Ohlson (1995, 1996) are correlated with a market-based measure of conservatism, the Spearman correlations have the wrong sign. Finally, I compare the value estimates implied by these four models with current stock price. First, I find that although the implied values

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[1] In clean surplus accounting, all changes in equity, not due to transactions with owners, flow through the income statement.

[2] Throughout this paper, I use the term "residual income" rather than the standard "abnormal earnings" because readers tend to relate abnormal earnings with abnormal stock market returns or unexpected earnings. Residual income (RI) may be completely anticipated. In fact, RI valuation depends on the anticipation of future RI.

are significantly correlated with market prices, this is primarily due to the correlation between book value and stock price. Second, I find that these models consistently understate firm value and misweight current accounting information given current price.[3] The theoretical models of the RI time series seem to significantly underestimate the market's expectations of future RI. This suggests that current theoretical models of RI are incomplete and/or that RI may be a nonstationary time series.

This paper contributes to the growing literature on accounting-based valuation in two ways. First, it points out mistakes inherent in the implementation of RI valuation. Second, it presents evidence on the descriptiveness of existing theoretical models of the information dynamics and offers suggestions for modifying the information dynamics in a manner that does not involve modeling inconsistencies.

The remainder of this paper documents the process of empirically estimating RI valuation. The residual income valuation models are examined in section II. Hypotheses are developed in section III. Section IV describes the data used for empirical estimation. Results are reported in section V, and section VI concludes the paper.

II. RESIDUAL INCOME VALUATION MODELS

Clean Surplus and the Dividend Discount Formula

The clean surplus relation (CSR) is a restriction on the relation between accounting earnings (x), accounting book value of equity (bv) and net dividends (d) through time (t):

$$bv_t = bv_{t-1} + x_t - d_t. \qquad \text{CSR}$$

The CSR can be solved for dividends, and holds regardless of accounting method choice, so that:

$$d_t = bv_{t-1} + x_t - bv_t.$$

Using the CSR and the dividend discount formula:

$$V_t = \sum_{\tau=1}^{\infty} E\left[\frac{d_{t-\tau}}{(1+r)^{\tau}}\right]$$

where V is the "intrinsic" value and r is the discount rate, firm value can be written in terms of expected future accounting earnings and book values:

$$V_t = bv_t + \sum_{\tau=1}^{\infty} E\left[\frac{x_{t+\tau} - r \cdot bv_{t+\tau-1}}{(1+r)^{\tau}}\right]. \qquad (1)$$

The only assumption required to move from the dividend discount formula to equation (1) is clean surplus. However, this assumption is not sufficient to perform valuation.

Implementation Issues

Because expectations are unobservable, and equation (1) is a function of expectations, an additional assumption that links observable information with expectations of future RI is unavoidable. Two basic techniques have been used to estimate the market's expectations of future RI: averaging across realizations (Bernard 1994; Penman and Sougiannis 1998) and projecting current information into the future (Stober 1996; Dechow et al. 1998; Frankel and Lee 1998; Lee et al. 1998). Studies using the first technique have been used empirically to evaluate equation (1).[4] Studies using the second technique step beyond equation (1) and examine the relation between firm value and current observables. This study concentrates on the second approach.

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[3] I use price as the benchmark for the firm's intrinsic value. My analysis assumes that prices are correct, on average, during the sample period.

Ohlson (1995) and Feltham and Ohlson (1995) demonstrate that identifying the joint time series of accounting book values and RI provides a basis for determining the relation between current accounting numbers and "intrinsic" value. The time series of book values and RI can take any form that is consistent with the laws of probability. However, the time-series models used in past empirical research often violate the law of iterated expectations. Additionally, most time-series models do not provide a closed-form price equation. Ohlson (1990, 665) suggests that a linear information dynamic seems essential to obtain prices that are linear in the observable variables.

Linear Information Models

I begin by examining a general class of information dynamics that is both consistent with rational expectations and will provide a tractable price function. The linear relationship between current information and future RI can be described by a finite difference equation:

$$RI_{t+1} = \omega_{10} + \omega_{11} RI_t + \omega_{12} z_{2t} + \cdots + \omega_{1n} z_{nt} + \varepsilon_{1t+1} \tag{2}$$

where the z_{it} are information other than past values of RI and ε_{1t} is mean-zero random error. The ω_{1i} characterize the marginal change in period $t + 1$ expected RI for a unit change in z_{it}. Valuation requires estimating the present value of the entire series of future RI. Each z_{it} in equation (2) may be stochastic and may be influenced by other variables in the system. To estimate $RI_{t+\tau}$ for $\tau > 1$, we must also characterize each z_i series:

$$\begin{aligned}
z_{2t+1} &= \omega_{20} + \omega_{21}RI_t + \omega_{22}z_{2t} + \cdots + \omega_{2n}z_{nt} + \varepsilon_{2t+1},\\
z_{3t+1} &= \omega_{30} + \omega_{31}RI_t + \omega_{32}z_{2t} + \cdots + \omega_{3n}z_{nt} + \varepsilon_{3t+1},\\
&\quad\vdots \qquad\qquad\qquad \vdots\\
z_{nt+1} &= \omega_{n0} + \omega_{n1}RI_t + \omega_{n2}z_{2t} + \cdots + \omega_{nn}z_{nt} + \varepsilon_{nt+1}.
\end{aligned} \tag{3}$$

Future realizations of each of the other information variables are linear functions of current observables (including RI) plus error.

Let $\mathbf{z}_t$ be the vector of information variables, Θ_t be the information available at time t and Ω be the transition matrix of ω_{ij} coefficients from equation (3). Then $E(\mathbf{z}_{t+\tau}|\Theta_t) = \Omega^\tau \mathbf{z}_t$. That is, the expected value of the variables in the information system at date $t + \tau$ is determined by the current value of $\mathbf{z}$ and the matrix of time-series parameters. This ensures a price function:

$$V_t = bv_t + \alpha_0 + \alpha_1 RI_t + \alpha_2 z_{2t} + \cdots + \alpha_n z_{nt} \tag{4}$$

---

[4] For instance, using equation (1), Bernard (1994) finds that two-thirds of the cross-sectional variation in price is explained by current book values, future return on equity and growth in book value.

where V is the value implied by the linear system. Linearity is necessary to calculate the valuation parameters, $\alpha_0, \alpha_1, \ldots, \alpha_n$. Although internally consistent valuation models of some nonlinear information dynamics may exist, they are generally not tractable. Ohlson (1990, 665) states, "there is no reason suggesting that other kinds of models can be used to determine [firm] value."

To demonstrate, assume that RI is an autoregressive process with an intercept:

$$RI_{t+1} = \omega_{10} + \omega_{11}RI_t + \varepsilon_{t+1}. \tag{5}$$

The linearity of the information dynamics implies that this system will support a valuation function that is linear in current information (Garman and Ohlson 1980):

$$P_t = bv_t + \alpha_0 + \alpha_1 RI_t \tag{6}$$

and

$$P_{t+1} = bv_{t+1} + \alpha_0 + \alpha_1 RI_{t+1}. \tag{7}$$

Equations (6) and (7) describe the relation between RI, book value and price at times t and t + 1. Although the valuation coefficients, α_0 and α_1, are unknown, no arbitrage and the information dynamics link equations (6) and (7). No arbitrage imposes a restriction between price at time t and expected price at time t + 1:

$$E(P_{t+1} + d_{t+1}) = (1 + r) \cdot P_t. \tag{8}$$

Substituting equations (6) and (7) into equation (8):

$$E(d_{t+1} + bv_{t+1} + \alpha_0 + \alpha_1 RI_{t+1}) = (1 + r)(bv_t + \alpha_0 + \alpha_1 RI_t). \tag{9}$$

Clean surplus and the definition of RI ensures:

$$bv_{t+1} = (1 + r)bv_t + RI_{t+1} - d_{t+1}. \tag{10}$$

Substituting equations (5) and (10) into equation (9):

$$bv_t + (1 + r)(\alpha_0 + \alpha_1 RI_t) = bv_t + \omega_{10} + \omega_{11}RI_t + \alpha_1(\omega_{10} + \omega_{11}RI_t).$$

Simplifying provides:

$$(1 + r)(\alpha_0 + \alpha_1 RI_t) = \alpha_0 + (1 + \alpha_1)(\omega_{10} + \omega_{11}RI_t). \tag{11}$$

To solve for the valuation coefficients of equations (6) and (7), equate the coefficients on RI and solve for α_0 and α_1:

$$\alpha_0 = \frac{(1 + \alpha_1)\omega_{10}}{r}.$$

$$\alpha_1 = \frac{-r \cdot \alpha_0 + \omega_{10} + \omega_{11}}{1 + r - \omega_{10} - \omega_{11}}.$$

Simplifying provides:

$$\alpha_0 = \frac{1 + r}{r} \cdot \frac{\omega_{10}}{(1 - \omega_{11})} \tag{12}$$

and

$$\alpha_1 = \frac{\omega_{11}}{1 + r - \omega_{11}}. \tag{13}$$

Equations (12) and (13) follow directly from Ohlson (1995) when RI is not equal to zero on average.

Linear information models provide the framework for the development of empirically testable models of accounting-based valuation. With nonlinear information dynamics, equations (6) and (7) do not obtain and equations (12) and (13) cannot be calculated. However, researchers often find the linearity of the information dynamics to be constraining or counter-intuitive.

Nonlinear Information Dynamics and Internal Inconsistencies

Two studies that use historical data to estimate firm value using the RI valuation model are Frankel and Lee (1998) and Dechow et al. (1998). Each of these studies modifies the information dynamics in an intuitively appealing way but both fail to preserve internal consistency. The point of analyzing the theoretical aspect of these empirical studies is to demonstrate that adopting information dynamics that seem reasonable in isolation can generate rather subtle inconsistencies when evaluated within the totality of the model linking information to firm value.

Intertemporal Inconsistency

In one part of their analysis, Frankel and Lee (1998) use a projection of current return on equity (ROE) to estimate future RI. To be consistent with their analyst forecast model, they model expectations of future ROE as a piecewise function. In the short run, ROE is estimated to be constant and in the long run, RI is estimated to be constant (i.e., RI is assumed to be constant in the terminal value computation).

No arbitrage requires a consistency between intrinsic values and terminal values (Penman 1997). However, as implemented, piecewise functions of the information dynamics often imply arbitrage. This occurs because every period that currently lies in the long run will eventually cross into the short run. At that point, the information dynamics change predictably. To be rational, expectations must anticipate this change. However, piecewise models do not allow for this anticipation, so the posited beliefs violate the law of iterated expectations. As shown in the appendix, a valuation model that ignores predictable changes in the information dynamics posits rational pricing of irrational beliefs.

Underspecified Information Dynamics

A similar violation of rationality can occur when researchers try to improve the information dynamics. Dechow et al. (1998) estimate a modified (conditional) version of equation (5) with five conditioning variables, including the absolute value of abnormal earnings and the absolute value of special items. These additional variables are analogs to the z variables in equation (2):

$$RI_{t+1} = \omega_0 + \omega_{11}RI_t + \omega_{12}z_{2t} + \cdots + \omega_{16}z_{6t} + \varepsilon_{t+1}. \tag{14}$$

Rather than estimating the system of equations (3) describing the time series of z_2 through z_6, Dechow et al. (1998) assume that the modified autoregressive parameter (ω_m) is the sum of ω_{11} through ω_{16}. They then use the price function:

$$P_t = bv_t + \alpha_m RI_t \tag{15}$$

where

$$\alpha_m = \frac{\omega_m}{1 + r - \omega_m}. \tag{16}$$

Equation (16) is the equilibrium price coefficient on RI from Ohlson (1995). However, Ohlson (1995) uses different information dynamics. Equation (14) does not support the price function (15) for two reasons. First, the information dynamics contain a nonzero intercept, so the equilibrium price function must contain an intercept. When Dechow et al. (1998) estimate equation (5) using a discount rate of 12 percent, they find an intercept of -2 percent of price and an autoregressive parameter of 0.62. Substituting these parameter estimates into equation (12), the equilibrium intercept on the price function is -49 percent of price. Accordingly, equation (15) overstates the implied value by more than 49 percent. Second, the time-series equation (14) does not support the price equation (15) because the implied time series of z_2 through z_6 are logically inconsistent. Dechow et al. (1998) do not estimate the time series of z_2 through z_6, implying that they are constants. However, the expected value of their $z_{it+\tau}$ cannot be constant in expectation because each is a function of $RI_{t+\tau-1}$ which, in turn, is a function of ω_m and RI_t.[5] If the model predicts that $E(RI_{t+1})\ \omega_m\ RI_t$, then it cannot also assume that $E(|RI_{t+1}|) = RI_{t+1}$ and that ω_m is less than one.

The *equilibrium* price coefficients will be a complex function of ω_{11} through ω_{66}. I later show that the value function for a two-variable information dynamic has price coefficients that are a complex ratio of the six information dynamic parameters and the discount rate. The equilibrium coefficients for a six-variable system would each contain up to 42 parameters. Although the method for obtaining the equilibrium price coefficients for this system is a straightforward extension of equations (6) through (11), the required algebra is daunting. It is clear however, that simply summing the coefficients in equation (14) does not provide the equilibrium price.

The Implementation of Equilibrium Models of Residual Income Valuation

In the remainder of this section, I outline four different information dynamics and the equilibrium price equations that they imply. The empirical performance of these models is evaluated in the following section.

The Ohlson Model—LIM1

Intuition suggests that the persistence of monopoly rents must affect RI. Although monopoly rents may persist for some time, competition should force returns toward the cost of capital. Modeling the RI series as an autoregressive process captures this notion. Ohlson (1995) proposes a bivariate autoregressive model of RI. Because past realizations of RI may not be the only predictor of future RI, the influence of nonaccounting information on future RI is modeled as a second related autoregressive process, that is:

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[5] Each of the z_{it} is a function of the absolute value of RI, so if RI is nonconstant, then each z_{it} must be nonconstant.

$$\begin{aligned} RI_{t+1} &= \omega_{11}RI_t + \nu_t + \varepsilon_{1t+1}, \\ \nu_{t+1} &= \gamma\nu_t + \varepsilon_{2t+1}, \end{aligned} \qquad \text{LIM1*}$$

where ν_t is information about future RI that has yet to reach the accounting system. Possible examples are order backlog or a newly signed contract. LIM1* does not specify what the ν_t is and it is not possible to explicitly control for all possible ν_t.

It is common in the empirical literature to ignore ν_t because it is unobservable (Stober 1996; Dechow et al. 1998). However, when γ is nonzero, omitting ν_t from LIM1* has consequences for empirical estimation. When ν_t is ignored, it becomes part of the error. The mean of ν_t (and consequently the errors) may be nonzero and may be correlated through time. The intercept in LIM1* will also be nonzero if the discount rate differs from ROE, on average. An empirical estimate of LIM1* should allow for a nonzero intercept and test for autocorrelation in the errors. When ν_t is unobservable, LIM1* is equivalent to equation (5):

$$RI_{t+1} = \omega_{10} + \omega_{11}RI_t + \varepsilon_{1t+1}. \qquad \text{LIM1}$$

This implies the valuation formula:

$$V_1 = bv_t + \alpha_0 + \alpha_1 RI_t \qquad V_1$$

where α_0 and α_1 are as described in equations (12) and (13):

$$\alpha_0 = \frac{1 + r}{r} \cdot \frac{\omega_{10}}{(1 - \omega_{11})}, \qquad V_{1.0}$$

$$\alpha_1 = \frac{\omega_{11}}{1 + r - \omega_{11}}. \qquad V_{1.1}$$

The Feltham and Ohlson Model—LIM2

Historical cost accounting differs systematically from fair value accounting. Even if competition drives economic rents to zero over time, other factors such as accounting conservatism may influence the long-run RI series. Feltham and Ohlson (1995) separate operating and financial assets. Conservative accounting systematically understates the value of operating assets. Therefore, one effect of accounting conservatism is that it reduces the benchmark for normal earnings. To allow for understated assets, Feltham and Ohlson (1995) propose a second linear information model (LIM2*):[6]

$$\begin{aligned} RI_{t+1} &= \omega_{11}RI_t + \omega_{12}bv_t + \nu_{1t} + \varepsilon_{1t+1}, \\ bv_{t+1} &= \omega_{22}bv_t + \nu_{2t} + \varepsilon_{2t+1}, \\ \nu_{1t+1} &= \gamma_1\nu_{1t} + \varepsilon_{3t+1}, \\ \nu_{2t+1} &= \gamma_2\nu_{2t} + \varepsilon_{4t+1}. \end{aligned} \qquad \text{LIM2*}$$

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[6] Although Feltham and Ohlson (1995) use financial assets and operating income, I include all net assets and all earnings for two reasons. First, RI and operating RI are equal since financial assets only earn the normal return. Second, it is difficult to separate out all assets that are held at market value and the interest associated with these assets. In analysis not reported, I attempt to remove financial assets and interest. The empirical results are very similar.

As with LIM1, ω_{11} is the persistence of monopoly rents. The book value effect of RI is captured by ω_{12}, the conservatism parameter. When the accounting is conservative, the conservatism parameter, ω_{12}, should be greater than zero because a portion of RI stems from the conservative valuation of book value rather than from monopoly power. Growth in book value is captured by ω_{22}, which must be equal to or greater than one for a going concern, but less than one plus the discount rate. Because the v variables are unobservable and residual income may not be zero on average, I estimate the first equation in LIM2* with an intercept:[7]

$$\begin{aligned} RI_{t+1} &= \omega_{10} + \omega_{11}RI_t + \omega_{12}bv_t + \varepsilon_{1t+1}, \\ bv_{t+1} &= \omega_{22}bv_t + \varepsilon_{2t+1}. \end{aligned} \tag{LIM2}$$

This model implies the valuation equation:

$$V_2 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2)bv_t \tag{V_2}$$

where

$$\alpha_0 = \frac{\omega_{10}}{[(1 + r) - \omega_{11}]r}, \tag{$V_{2.0}$}$$

$$\alpha_1 = \frac{\omega_{11}}{[(1 + r) - \omega_{11}]}, \tag{$V_{2.1}$}$$

$$\alpha_2 = \frac{\omega_{12}(1 + r)}{[(1 + r) - \omega_{11}][(1 + r) - \omega_{22}]}. \tag{$V_{2.2}$}$$

The Clean Surplus Effects of Conservatism—LIM3

The actual effects of conservatism may be more complex than can be captured by a single parameter on book value. In a clean surplus system, the understatement of assets results from the understatement of revenue or the overstatement of expenses. Conservatism affects both the income and the book value components of RI. For example, accelerated depreciation affects both book value and expenses. The book value effect overstates RI because the charge for the use of capital is too small. The income effect understates RI in the early years because the depreciation expense is too large. The magnitude of the income effect is a function of growth (Beaver and Ryan 1998). Under no growth, the firm will achieve equilibrium where the level of conservatism does not affect the reported income. However, while the firm is growing, more conservative accounting systems will lead to lower reported earnings.

Feltham and Ohlson (1996) develop a model of conservative clean surplus accounting for a firm that generates cash flows by investing in a depreciable asset. To assess the determinants of the income and book value effects of conservatism, one can extend the model to the linear information framework. The productive technology is described with the following cash flow dynamic equations:[8]

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[7] The parameter v_{2t} may also be nonzero on average implying a nonzero intercept in the second equation of LIM2*. However, estimation of an intercept in this equation is difficult due to the nonstationarity of bv. Therefore, in the empirical estimation, I constrain the intercept in the second equation of LIM2* to be zero.

[8] Although profitability may affect capital expenditures, due to the complexity of the price coefficients, I develop the price equation constraining this influence to be zero.

$$\begin{aligned} cr_{t+1} &= \gamma\, cr_t + \kappa\, capx_t + \varepsilon_{1t+1}, \\ capx_{t+1} &= \omega\, capx_t + \varepsilon_{2t+1}, \end{aligned}$$

where cr is cash receipts, capx is the capital investment in assets, γ is the economic depreciation, κ describes the expected profitability of investments and ω describes the rate of investment growth.

The firm uses historical cost accounting and depreciates assets using declining balance depreciation:

$$bv_{t+1} = \delta\, bv_t + capx_{t+1}$$

where bv is the cost of net assets less accumulated depreciation. Earnings, x_t, are equal to cash receipts, cr_t, less depreciation expense, $(1 - \delta)bv_{t-1}$:

$$x_t \equiv cr_t - (1 - \delta)bv_{t-1}.$$

As before, RI is the difference between earnings and a charge for the use of book value:

$$\begin{aligned} RI_t &\equiv x_t - (r)bv_{t-1}, \\ &= cr_t + (\delta - 1 - r)bv_{t-1}. \end{aligned}$$

Algebraic manipulation yields the time series of the system of accounting information under this model:

$$\begin{aligned} RI_{t+1} &= \omega_{11}RI_t + \omega_{12}bv_t + \omega_{13}capx_t + \varepsilon_{1t+1}, \\ bv_{t+1} &= \omega_{22}bv_t + \omega_{23}capx_t + \varepsilon_{2t+1}, \\ capx_{t+1} &= \omega_{33}capx_t + \varepsilon_{3t+1}, \end{aligned} \qquad \text{LIM3}$$

where, if we assume a zero expected net present value investment on average, $(\kappa = 1 + r - \gamma)$:

$0 \leq \omega_{11}$ (the rate of economic decay) ≤ 1,

ω_{12} (the book value effect of conservatism) $= \left[\frac{(\delta - \gamma)[\delta - (1 + r)]}{\delta}\right] \geq 0$,

and ω_{13} (the income effect of conservatism) $= (\delta - \gamma)\left[1 - \frac{[\delta - (1 + r)]}{\delta}\right] \leq 0$.

LIM3 captures all three of the factors identified as affecting the RI series. First, ω_{11} captures the influence of monopoly rents. When the accounting system is unbiased ($\delta = \gamma$), ω_{12} and ω_{13} are zero; RI is purely the result of economic forces and decays at the same rate as monopoly rents, γ. Second, ω_{12} captures the book value effect of conservatism. When there is no new investment at date t, accelerated depreciation will overstate the rate of decay of existing assets by $(\delta - \gamma)$. Because the assets are more understated at date t than they were at date t − 1, the normal earnings, $(r \cdot bv_t)$, will be reduced, thereby increasing date t + 1 RI. Third, ω_{13} captures the income effect of conservatism. Assets are held at their market value when they are purchased. Therefore, the book value effect in the first period is zero. However, depreciation expense is overstated by the income effect, $(\delta - \gamma)\, capx_t$, thereby reducing date t RI. If the average capital expenditure is a positive net present value investment ($\kappa > 1 + r - \gamma$), then ω_{13} may be greater than zero.

Allowing for a nonzero intercept, LIM3 implies the value equation:

$$V_3 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2) bv_t + \alpha_3\, capx_t \qquad V_3$$

where

$$\alpha_0 = \frac{\omega_{10}}{[(1 + r) - \omega_{11}]},$$

$$\alpha_1 = \frac{\omega_{11}}{[(1 + r) - \omega_{11}]},$$

$$\alpha_2 = \frac{(1 + r)\omega_{12}}{[(1 + r) - \omega_{11}][(1 + r) - \omega_{22}]},$$

$$\alpha_3 = \frac{(1 + r)[\omega_{12}\omega_{23} + (1 + r)\omega_{13} - \omega_{13}\omega_{22}]}{[(1 + r) - \omega_{11}][(1 + r) - \omega_{22}][(1 + r) - \omega_{33}]}.$$

The three linear information models discussed so far have not incorporated nonaccounting information. In the next section, nonaccounting numbers are incorporated into the analysis.

Incorporating Nonaccounting Information—LIM4

Two possible approaches to improving on the LIMs are, first, to model the accounting system more thoroughly (such as in LIM2 and LIM3) and, second, to utilize information that is available to market participants but that has not yet been incorporated into the accounting system. Equation (1) makes clear that nonaccounting information is relevant for valuation only if it affects expectations about future RI. The linear models provide a structure for adding nonaccounting information into the analysis. Information that will affect future RI, either directly or indirectly, can be incorporated into the analysis as an additional variable in the transition matrix. Obvious candidates for this are new patents, regulatory approval of a new drug for pharmaceutical companies, new long-lived contracts and order backlog. Because order backlog is readily available, I augment LIM2 with order backlog as the additional variable, ν.

$$\begin{aligned} RI_{t+1} &= \omega_{10} + \omega_{11} RI_t + \omega_{12} bv_t + \omega_{13} bklog_t + \varepsilon_{1t+1}, \\ bv_{t+1} &= \omega_{22} bv_t + \varepsilon_{2t+1}, \\ bklog_{t+1} &= \omega_{33} bklog_t + \varepsilon_{3t+1}. \end{aligned} \qquad \text{LIM4}$$

On average, order backlog should indicate increased RI in the following period. First, temporary shortages of inventory, capacity, or labor may cause backlogs. This should depress current RI and as the shortages ease, RI should grow. Alternatively, order backlog may be due to increased demand. In this case, current RI would be normal, but future RI should grow as orders are filled. This implies that ω_{13} will be greater than zero.

III. HYPOTHESIS TESTING

Model Estimation

Two possible methods to estimate the LIMs are (1) year-by-year, in the cross-section, and (2) firm-by-firm, in a time series. I estimate the parameters of the LIMs as a time series rather than in the cross-section because the parameters of the LIMs must be a function of the firms' economic pressures, production technology and accounting policies, and adding conditioning variables to control for these forces is difficult. Estimating the information dynamics firm-by-firm allows for cross-sectional variation in the persistence of RI while preserving internal consistency.

Each firm's coefficients from the RI equations are estimated using an ordinary least squares (OLS) time-series regression. The other equations in the system cannot be estimated using OLS because of nonstationarity. When a variable grows over time, OLS time-series estimates are inconsistent (Hamilton 1994). The usual remedy for this is to use OLS to estimate the time series of the first differences of the variable. However, when the time series of the first differences is linear, the time series of the levels is nonlinear. Thus, OLS cannot be used for estimating the linear information dynamics of nonstationary variables. Because book value of equity and capital expenditures tend to grow on average for most firms, I estimate the expected future growth rate of these variables as the median of the year-to-year past growth rates.[9]

Price Level Regressions

As section II demonstrates, the information dynamics imply a linear relation between current accounting numbers and current price (the price function). After estimating the information dynamics, I calculate the price function coefficients implied by the estimated information dynamics. As a test of how closely the information dynamics conform to market expectations, I compare the price coefficients implied by the median information dynamics parameter estimates to the coefficients from cross-sectional regressions of price on the information variables. The cross-sectional regressions are estimated for 1996, which is the last year of the sample period.[10]

Tests of the Linear Information Models

The first set of tests is designed to determine how well LIM1, LIM2, LIM3 and LIM4 describe the joint time series of accounting information for the average firm. Each of the models makes predictions about the coefficients. I test whether the estimated coefficients from the four models fall within the hypothesized range.

The Ohlson Model—LIM1

LIM1 models the evolution of RI for an unbiased accounting system. The model predicts positive serial correlation of the RI, so the coefficient from LIM1 is between zero and one:

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[9] For example, I estimate the growth rate of equity for each firm as the median ratio of year t + 1 book value of equity to year t book value of equity. The second equation in LIM3 presents another estimation problem because both bv_t and $capx_t$ are needed to estimate bv_{t+1}. To estimate this equation, I first calculate the median growth rate of capx. I then regress the difference between bv_t and estimated (based on average growth) $capx_t$ on bv_{t-1}. The resulting coefficient is the estimated ω_{22}. Note that in LIM3, ω_{22} is not the growth rate of book value, but one minus the depreciation rate.

[10] Limiting this investigation to a single year raises the possibility that the average firm was mispriced in that year. However, performing this analysis in other years requires either reducing the sample period for estimating the information dynamics or including accounting information in the LIM model that was not available when firm values were determined. Analysis, not reported in the tables, confirms that regression coefficients estimated in other years (1990, 1995) do not differ materially from those reported.

H_{1a}: $0 < \omega_{11} < 1$.

The Feltham and Ohlson Model—LIM2

Feltham and Ohlson (1995) model the effects of conservatism on the information dynamics. This model predicts that RI is positively correlated with lagged RI and the lagged book value of equity, so both ω_{11} and ω_{12} are between zero and one:

H_{1b}: $0 < \omega_{11} < 1$ and $0 < \omega_{12} < 1$.

The Clean Surplus Effects of Conservatism—LIM3

The clean surplus model predicts that RI will be positively correlated with lagged RI and lagged book value. The model also predicts that RI will be negatively correlated with lagged capital expenditures, so both ω_{11} and ω_{12} are between zero and one and ω_{13} is less than zero:

H_{1c}: $0 < \omega_{11} < 1$, $0 < \omega_{12} < 1$ and $\omega_{13} < 0$.

Incorporating Nonaccounting Information—LIM4

Ohlson (1995) and Feltham and Ohlson (1995) suggest a method for incorporating additional information into the expectations model of future RI. I implement this methodology by adding order backlog to LIM2. LIM4 predicts that order backlog should translate into positive future RI and should decay over time. For LIM4, this implies the coefficients:

H_{1d}: $0 < \omega_{13} < 1$ and $0 < \omega_{33} < 1$.

The Implied Price Coefficients

The second set of tests is designed to determine how well the linear information models conform to the market's expectations.[11] Using coefficient estimates from time-series models, current accounting numbers and the associated valuation models, I estimate firm value. Three tests are conducted to test how well the estimated value (V) measures value. First, I test whether V is equal to price (P) on average:

H_{2a}: $V/P = 1$.

Second, I test whether V is correlated with price in the cross-section:

H_{2b}: $\text{Corr}(V, P) > 0$.

Third, I examine whether the median firm-specific valuation coefficients implied by the time-series models are equivalent to the estimated coefficients in the cross-sectional regressions of price on the information variables:

H_{2c}: The coefficients on the information variables in the price level regressions are equivalent to the median valuation coefficients implied by the estimated coefficients in the linear information models.

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[11] Implicit in these tests is the belief that market prices are correct on average.

The LIMs' Measurement of Accounting Conservatism

The models of conservatism presented in Feltham and Ohlson (1995, 1996) make predictions about the effect of conservatism on the parameters in LIM2 and LIM3. The final set of tests determines whether the conservatism parameters are associated with an independent, market-based measure of conservatism. The level of conservatism of a firm's accounting policies is a function of its accounting method choices (e.g., straight-line or accelerated depreciation) and the assumptions underlying those choices (e.g., five vs. ten years of depreciable life). This makes identifying the level of conservatism problematic. For example, Bernard (1994) has difficulty identifying measurable differences in the level of conservatism among firms based on accounting methods reported on Compustat. Nonetheless, because all parameters of the LIMs are likely to be affected by the level of conservatism, I attempt to characterize the level of conservatism separately for each firm in the sample. Conservatism can also be estimated as in Beaver and Ryan (1998). They calculate the persistent portion of each firm's book-to-market ratio (BTM) and measure conservatism as the coefficient C_i for firm i, in the following regression:

$$BTM_{it} = \alpha_t + C_i + \sum_{1}^{6}\beta_j R_{i,t+1-j} + e_{it} \tag{17}$$

where BTM is the ratio of the book value of equity to the market value of equity at the fiscal year-end, bv_t/P_t. The year effect is captured by α_t, while C_i captures the firm effect (the persistent component of the firm's BTM). The β_js are coefficients on the firm's stock return, R_t. The parameter C_i captures the persistent portion of the difference between the accounting system's and the market's measures of common equity. Beaver and Ryan (1998) document that this parameter is associated with other measures of conservatism such as research and development expense and the use of accelerated depreciation. Using C as an independent measure of conservatism, I estimate its correlation with the conservatism parameters from LIM2 and LIM3, and I estimate the conservatism parameters for the quartile of firms with the most conservative measures of C.

I test for a relationship between the market-based conservatism parameter, C, and the LIM-based conservatism parameters, ω_{12} and ω_{13}. First, I test how well the models of conservatism describe the LIMs of the most conservative firms (based on C).

H_{3a}: Hypotheses 1b and 1c hold for the most conservative firms.

Second, I test the association between the market-based conservatism parameter, C, and the LIM-based conservatism parameters ω_{12} (ω_{13}):

H_{3b}: $\text{Corr}(\omega_{12}, C) < 0$ and $\text{Corr}(\omega_{13}, C) > 0$.[12]

IV. DATA AND SAMPLE SELECTION

The initial sample consists of all nonfinancial firms with the necessary data on the 1997 Compustat annual data file. To be included, common equity, income before extraordinary items available for common, market price and the number of common shares outstanding must be available for at least 15 of the 22 years between 1975 and 1996, inclusive. The elimination of firm-years before 1975 should reduce problems with nonstationarity while providing sufficient data to estimate the system. Firm-years with negative equity values are omitted. For tests involving order backlog, the additional requirement of at least five years of nonzero order backlog is imposed. Finally, for the conservative subsample, returns must be available from CRSP for at least 15 years during the sample period.

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[12] The book-to-market ratio will be smaller for more conservative firms. Therefore, smaller (more negative) C_i indicate more conservative accounting policies.

Estimating the Cost of Capital

Lee et al. (1998) find that value estimates track stock prices more closely when a time-varying component of the cost of capital is used. Accordingly, I calculate the following discount rate for each firm-year:

$$r_e(j,m) = r_f(m) + r_{prem}(j)$$

where

$r_e(j,m)$ = the estimated cost of equity for firm j in month m;
$r_f(m)$ = the annualized one month t-bill rate at fiscal year-end;
$r_{prem}(j)$ = the risk premium for firm j.

The risk premium, $r_{prem}(j)$, is the firm's industry risk premium as estimated by Fama and French (1997).[13] RI is calculated as earnings before extraordinary items minus $r_e(j,m) \cdot bv_{t-1}$. Earnings before extraordinary items does not correspond perfectly with the theory because it does not provide a clean surplus accounting system. However, Abarbanell and Bernard (1997, 5) suggest that it is a good approximation in expectation. Other violations of clean surplus that could affect the information dynamics are prior period adjustments, changes in accounting policies and the consolidation of partially owned subsidiaries.[14] Firm value is calculated at the fiscal year 1996, the last year in the sample period. The mean (median) discount rate over the sample period is 12.13 (11.78) percent.[15]

V. RESULTS

Table 1 presents descriptive statistics calculated for all firm-years. Panel A presents results for all 44,980 firm-years in the full sample. The median return-on-equity (ROE) is 10.7 percent and median residual income (RI) is −$0.72 million, approximately negative one percent of median book value. The negative median RI is consistent with prior research and is due to the fact that the discount rate is higher than ROE, on average. The 10,420 firm-years in the conservative subsample differ significantly from the full sample. The conservative firms (panel B) are larger[16] and they have higher ROEs and RIs than the nonconservative firms, suggesting that the book value effect of conservatism dominates the income effect for the average firm.[17]

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[13] I use the risk premia calculated as of 12/31/94.

[14] Because it is not clear how each of these violations would affect the information dynamics or how to incorporate them into the model, I leave this to future research.

[15] Analysis, not reported, is also conducted with constant discount rates of 9, 10 and 11 percent. The results do not differ materially from those reported in tables 2 through 7.

[16] This may seem counter-intuitive because small start-up firms are frequently cited as being the most conservative. However, the smallest firms are not included in my sample because of data requirements; to allow for sufficient degrees of freedom, a firm must be publicly traded for 15 years to be included in the analysis.

[17] The average BTM is smaller for the conservative firms by construction.

TABLE 1
Descriptive Statistics[a]

	Percentile				
Variable	*20%*	*40%*	*Median*	*60%*	*80%*
Panel A: All Firms					
ROE[b]	0.022	0.083	0.107	0.129	0.182
BTM[c]	0.403	0.624	0.738	0.867	1.251
bv[d]	11.820	40.735	72.788	130.107	554.263
RI[e]	−18.569	−2.445	−0.719	0.139	12.665
Panel B: Conservative Firms[f]					
ROE[b]	0.036	0.107	0.139	0.167	0.230
BTM[c]	0.243	0.354	0.412	0.475	0.642
bv[d]	12.321	68.771	130.769	236.670	814.100
RI[e]	−14.056	−0.499	0.667	6.483	65.696

[a] This table contains one observation for each of the 44,980 firm-years in the sample.

[b] ROE is earnings before extraordinary items divided by beginning of the year book value of equity.

[c] BTM is book value of equity divided by price at the end of the fiscal year.

[d] bv is book value of equity at the end of the fiscal year, in millions.

[e] RI is earnings before extraordinary items minus the risk-adjusted discount rate times book value of equity at the beginning of the year, in millions.

[f] Conservative firms are the 25 percent of firms with the smallest book-to-market ratio, on average, over the sample period, after controlling for recent stock price changes. There are 10,420 firm-years in the conservative subsample.

Results From Tests of the Linear Information Models

LIM1

Panel A of table 2 presents the distribution of parameter estimates for the simple time series of RI. Firm-specific autoregressive parameters for RI are estimated with linear regression. The five columns of panel A are the 20th through the 80th percentiles of the parameter estimates. More than 60 percent of the intercepts are negative. This is because the average discount rate is higher than the average ROE. The median autoregressive parameter, ω_{11}, is 0.234. While this supports H_{1a}, the parameter is smaller than might be expected given the relatively high serial correlation in ROE reported in other studies (Bernard 1994; Beaver and Ryan 1998).[18] From equation $V_{1.1}$, the median estimated ω_{11} implies that, on average, with a 11.78 percent discount rate (the sample median), the market should value $1 of current RI at $0.265. By comparison, if RI were perfectly persistent, $1 of RI would be worth $8.5, while if RI were purely transitory, then current RI would have a value of $0, after controlling for current book value.

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[18] Although not reported in the tables, I test for residual serial correlation in the time series model, that may be induced by omitting ν_t from empirical estimates of LIM1. The mean (median) residual serial correlation is −0.003 (−0.008) and is statistically insignificant. Also, the mean (median) Durbin-Watson (DW) statistic is 1.895 (1.942). There are few firms with DW statistics far from 2. Finally, I estimate the regressions after adding lagged values of RI. The mean coefficient on lagged RI is close to zero and is statistically insignificant.

TABLE 2
The Distribution of Parameter and Value Estimates Under LIM1

Panel A: RI Regression: $RI_{t+1} = \omega_{10} + \omega_{11}RI_t + \varepsilon_{t+1}$[a]

	Percentile				
Parameters	*20th*	*40th*	*50th*	*60th*	*80th*
ω_{10}	−1.497	−0.581	−0.354	−0.189	0.140
ω_{11}	−0.032	0.155	0.234	0.309	0.492

Panel B: Value/Price and Book/Price Comparisons[b]

Variables	*20th*	*40th*	*50th*	*60th*	*80th*
V_1/P	−0.380	0.238	0.411	0.554	0.950
bv/P	0.333	0.543	0.631	0.733	1.113

Panel C: Implied Price Coefficients and Price Level Regressions[c]

Dependent Variable	*Independent Variables*				
	Intercept	V_1[d]	RI_t	bv_t	*Adjusted* R^2
$Price_t$	17.709	0.392	—	—	
	(0.001)	(0.001)			0.384
$Price_t$	16.495	—	—	0.500	
	(0.001)			(0.001)	0.380
$Price_t$	29.690	—	1.205	—	
	(0.001)		(0.001)		0.034
$Price_t$	18.172	—	1.358	0.464	
	(0.001)		(0.001)	(0.001)	0.390
Implied Price Coefficients[e]	−4.385	—	0.265	1.000	—

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[a] Panel A presents the cross-sectional distribution of coefficient estimates from the time-series residual income (RI) regression of LIM1, estimated by firm. The five columns are the 20th to the 80th percentile estimates of the parameters. There are 2,601 firms in this panel.

[b] Panel B presents the distribution of value estimates (V_1) divided by market price (P) and book value (bv) divided by market price, as of the end of fiscal year 1996. There are 1,992 firms with value and price data available for this year.

[c] Panel C presents the price coefficients obtained by regressing price on V_1, RI and/or bv and the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A). P-values are presented in parentheses. They are determined by comparing the price coefficients with their implied values. The reported regression coefficients are obtained after removing up to two influential observations with Cook's distance greater than 2.

[d] $V_1 = bv_t + \alpha_0 + \alpha_1 RI_t$, where α_0 and α_1 are calculated using firm-specific ω estimates and equations $V_{1,0}$ and $V_{1,1}$. The significance of the intercept and slope coefficients in the regression of price on V are tested against their respective theoretical values of zero and one.

[e] These are the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A), the sample median risk-adjusted discount rate of 11.78 percent, and equations $V_{1,0}$ and $V_{1,1}$.

Panel B of table 2 presents the ratio of implied value (V_1) to actual price for all firms in the sample in 1996 (where 1996 is chosen to eliminate hindsight bias). The estimated value is calculated as:

$$V_1 = bv_t + \alpha_0 + \alpha_1 RI_t$$

where α_0 and α_1 are functions of the estimated ω_{10} and ω_{11} as in equations $V_{1.0}$ and $V_{1.1}$. If the model accurately values firms and the market price is correct on average, the expected ratio is 1. However, the median V_1/P is 0.411. This is significantly different from 1, which means that H_{2a} is rejected. The model fails to fully capture the market's expectations of future RI, even on average.[19]

The first four lines of panel C of table 2 are the results of cross-sectional linear regressions of price on the implied value, RI, and/or book value in 1996. The last line of panel C of table 2 presents the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A), the sample median risk-adjusted discount rate of 11.78 percent, and equations $V_{2.0}$, $V_{2.1}$ and $V_{2.2}$. The information in panel C is used to test H_{2b} and H_{2c}. While panel B examines whether V is correct on average, these tests examine whether variation in price is tracked by variation in estimated value. In the simple regression, the coefficient on V_1 (0.392) is significantly less than 1. The adjusted R^2 is 0.384. This supports H_{2b} as V is highly correlated with price. However, the results of a multiple regression of price on RI and book value are inconsistent with H_{2c}. The coefficient on book value is significantly less than 1 and the coefficient on RI is significantly greater than 0.265 (the coefficients implied by the median parameter estimates from LIM1 and V_1). This indicates that the weightings on the information models implied by LIM1 do not give the best linear unbiased estimates of firm price. Also, the adjusted R^2 of the regression of price on V_1 is almost equivalent to that of the regression of price on book value alone, revealing that the implied value does not approximate price any better than does book value alone.

Overall, the results are inconsistent with LIM1 describing the information environment and the valuation process very well. The model of RI significantly underestimates the present value of expected future RI that is implicit in the pricing process. A median value-to-price ratio of less than one is consistent with the value-to-price ratio found in other valuation studies (e.g., Dechow et al. 1998; Frankel and Lee 1998; Lee et al. 1998). Such an understatement of value can only occur because the discount rate is too high, or because the time series of RI is nonstationary. Myers (1998) estimates the risk-adjusted discount rate necessary to account for this magnitude of understatement to be 6.5 percent and finds evidence of nonstationarity in the RI series. Furthermore, from table 2, these value estimates fail to account for 61 percent of the variation in price. Apparently, on average, the market anticipates larger values of future RI than are captured by LIM1. Since the true time series may be affected by accounting conservatism, I now turn to the first model of conservatism.

LIM2

Panel A of table 3 presents the distribution of parameter estimates for the bivariate time series of RI and book value of equity (LIM2). More than 60 percent of the intercepts are positive. The median autoregressive parameter, ω_{11}, is 0.036. While this supports H_{1b}, it is smaller than the estimate from LIM1. However, inconsistent with H_{1b}, approximately 60 percent of the conservatism parameters, ω_{12}, are negative. This indicates that, if accounting

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[19] The median V/P is significantly less than that found in Dechow et al. (1998). This is primarily due to the negative intercept.

TABLE 3
The Distribution of Parameter and Value Estimates Under LIM2

Panel A: RI Regression: $RI_{t+1} = \omega_{10} + \omega_{11}RI_t + \omega_{12}bv_t + \varepsilon_{1t+1}$[a]

$bv_{t+1} = \omega_{22}bv_t + \varepsilon_{2t+1}$

	Percentile				
Parameters	*20th*	*40th*	*50th*	*60th*	*80th*
RI time series:					
ω_{10}	−0.038	0.013	0.071	0.205	1.530
ω_{11}	−0.003	0.014	0.036	0.053	0.174
ω_{12}	−0.071	−0.016	−0.005	0.000	0.002
bv time series:					
ω_{22}	0.914	1.032	1.061	1.093	1.173

Panel B: Value/Price and Book/Price Comparisons[b]

Variables					
V_2/P	0.339	0.549	0.644	0.757	1.179
bv/P	0.319	0.483	0.560	0.637	0.878

Panel C: Implied Price Coefficients and Price Level Regressions[c]

Dependent	*Independent Variables*				
Variable	*Intercept*	V_2[d]	RI_t	bv_t	*Adjusted* R^2
$Price_t$	14.736	0.531	—	—	
	(0.001)	(0.001)			0.392
$Price_t$	14.668	—	—	0.550	
	(0.001)			(0.001)	0.405
$Price_t$	25.504	—	0.951	—	
	(0.001)		(0.001)		0.031
$Price_t$	14.856	—	0.481	0.543	
	(0.001)		(0.001)	(0.001)	0.410
Implied Price Coefficients[e]	0.557	—	0.033	0.909	—

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[a] Panel A presents the cross-sectional distribution of coefficient estimates from the time-series residual income (RI) regressions of LIM2, estimated by firm. The five columns are the 20th to the 80th percentile estimates of the parameters. There are 1,982 firms in this panel.

[b] Panel B presents the distribution of value estimates (V_2) divided by market price (P) and book value (bv) divided by market price, as of the end of fiscal year 1996. There are 1,871 firms with the required data available for this year.

[c] Panel C presents the price coefficients obtained by regressing price on V_2, RI and/or bv and the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A). P-values are presented in parentheses. They are determined by comparing the price coefficients with their implied values. The reported regression coefficients are obtained after removing up to two influential observations with Cook's distance greater than 2.

[d] $V_2 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2) bv_t$, where α_0 to α_2 are calculated using the firm-specific ω estimates and equations $V_{2.0}$, $V_{2.1}$ and $V_{2.2}$. The significance of the intercept and slope coefficients in the regression of price on V are tested against their respective theoretical values of zero and one.

[e] These are the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A), the sample median risk-adjusted discount rate of 11.78 percent, and equations $V_{2.0}$, $V_{2.1}$ and $V_{2.2}$.

for these firms is conservative, LIM2 does not describe the effect of conservatism on the information dynamics. This finding is consistent with Stober (1996). The median growth parameter, ω_{22}, is 1.061 which is within the bounds required for a closed-form price solution.

Panel B of table 3 presents the distribution of V_2/P in 1996. The estimated value of V_2 is calculated as:

$$V_2 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2)bv_t$$

where α_0, α_1 and α_2 are functions of the estimated ω_{ij} from equations $V_{2.0}$, $V_{2.1}$ and $V_{2.2}$. If LIM2 holds, the expected value of V_2/P is 1. However, the median V_2/P is 0.644, which is significantly less than 1. This is inconsistent with H_{2a}, and indicates that a large portion of the market's expectation of future RI that is captured by price is not captured by LIM2. However, LIM2 allows for the apparent nonstationarity of RI and provides a better average measure of value than does LIM1.[20]

Panel C of table 3 presents the linear regressions of price on the implied value, RI and book value in 1996, and the implied price coefficients. In the simple regression of price on V_2, the coefficient on V_2 is only 0.531. This is significantly less than 1. Although the implied value is significantly correlated with price, as hypothesized in H_{2b}, the adjusted R^2 is only 0.392, which is slightly less than the adjusted R^2 from the regression of price on book value. It appears that the LIM2 parameter estimates are so noisy that they reduce the precision of the value estimates.

The results of a multiple regression of price on RI and book value are inconsistent with H_{2c}. The coefficient on bv (0.543) is significantly less than the implied value of 0.909 and the coefficient on RI (0.481) is significantly greater than the implied value of 0.033. These results are inconsistent with LIM2 accurately describing the bivariate time series of RI. The median conservatism parameter is negative and the adjusted R^2 from a regression of price on book value and RI is greater than the adjusted R^2 from a regression of price on V_2.

LIM3

Panel A of table 4 presents the distribution of parameter estimates for the multivariate time series of RI, book value of equity and capital expenditures (LIM3). As with LIM2, more than 60 percent of the intercepts are positive which means the valuation equation should have an intercept term. The median autoregressive parameter on RI, ω_{11}, is 0.167. However, LIM3 fails to meet the parameter restrictions of the information dynamics. Contrary to H_{1c}, the median book value conservatism parameter, ω_{12}, is significantly negative (−0.062). However, the median income parameter of conservatism, ω_{13}, is negative as expected.[21,22]

Panel B of table 4 presents the distribution of V_3/P in 1996. The estimated value of V_3 is calculated as:

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[20] As with LIM1, residual serial correlation may be induced by omitting ν_t from empirical estimates of LIM2. The mean (median) residual serial correlation is −0.023 (−0.019). The mean (median) Durbin-Watson statistic is 1.937 (1.958). LIM2 is also estimated after adding lagged values of RI and book values. The mean coefficients on lagged information are small and statistically insignificant. Only 6 (2) percent of the White's test statistics for heteroskedasticity are significant at the 10 (5) percent level.

[21] LIM3 models conservatism of capital investments. As an additional test, I redefine investment as research and development expenditures and rerun tests on 25 pharmaceutical manufacturers. The results for this subsample do not differ materially from the results reported in this section.

[22] The mean (median) residual serial correlation is −0.049 (−0.044) and is statistically insignificant. Only 2 (1) percent of the White's test statistics for heteroskedasticity are significant at the 10 (5) percent level.

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TABLE 4
The Distribution of Parameter and Value Estimates Under LIM3

Panel A: RI Regression:

$$\begin{aligned} RI_{t+1} &= \omega_{10} + \omega_{11}RI_t + \omega_{12}bv_t + \omega_{13}capx_t + \varepsilon_{1t+1}{}^{a} \\ bv_{t+1} &= \omega_{22}bv_t + \omega_{23}capx_t + \varepsilon_{2t+1} \\ capx_{t+1} &= \omega_{33}capx_t + \varepsilon_{3t+1} \end{aligned}$$

	Percentile				
Parameters	*20th*	*40th*	*50th*	*60th*	*80th*
RI time series:					
ω_{10}	−0.224	0.221	0.530	0.926	2.404
ω_{11}	−0.118	0.083	0.167	0.251	0.451
ω_{12}	−0.196	−0.092	−0.062	−0.030	0.041
ω_{13}	−0.579	−0.151	−0.048	0.011	0.322
bv time series:					
ω_{22}	0.610	0.721	0.757	0.794	0.863
capx times series:					
ω_{33}	0.540	0.860	0.987	1.117	1.548

Panel B: Value/Price and Book/Price Comparisons[b]

Variables					
V_3/P	−0.127	0.627	0.924	1.272	2.669
bv/P	0.306	0.477	0.553	0.630	0.876

Panel C: Implied Price Coefficients and Price Level Regressions[c]

Dependent	*Independent Variables*					
Variable	*Intercept*	$V_3{}^d$	RI_t	bv_t	$capx_t$	*Adjusted* R^2
$Price_t$	12.570	0.324	—	—	—	
	(0.001)	(0.001)				0.335
$Price_t$	19.860	—	—	—	0.014	
	(0.001)				(0.001)	0.147
$Price_t$	8.410	—	—	1.033	—	
	(0.001)			(0.001)		0.477
$Price_t$	22.248	—	1.424	—	—	
	(0.001)		(0.001)			0.019
$Price_t$	8.121	—	0.926	0.975	0.007	
	(0.001)		(0.001)	(0.001)	(0.001)	0.532
Implied Price Coefficients[e]	4.732	—	0.176	0.798	−3.766	—

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[a] Panel A presents the cross-sectional distribution of coefficient estimates from the time-series residual income (RI) regressions of LIM3, estimated by firm. The five columns are the 20th to the 80th percentile estimates of the parameters. There are 1,908 firms in this panel.

[b] Panel B presents the distribution of value estimates (V_3) divided by market price (P) and book value (bv) divided by market price, as of the end of fiscal year 1996. There are 1,872 firms with the required data available for this year.

[c] Panel C presents the price coefficients obtained by regressing price on V_3, RI, bv and/or capx and the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A). P-values are presented in parentheses. They are determined by comparing the price coefficients with their implied values. The reported regression coefficients are obtained after removing up to one influential observation with Cook's distance greater than 2.

[d] $V_3 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2)bv_t + \alpha_3 capx_t$, where α_0 to α_3 are calculated using the firm-specific ω estimates and equations $V_{3.0}$, $V_{3.1}$, $V_{3.2}$ and $V_{3.3}$. The significance of the intercept and slope coefficients in the regression of price on V are tested against their respective theoretical values of zero and one.

[e] These are the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A), the sample median risk-adjusted discount rate of 11.78 percent, and equations $V_{3.0}$, $V_{3.1}$, $V_{3.2}$ and $V_{3.3}$.

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$$V_3 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2)bv_t + \alpha_3 capx_t$$

where α_0, α_1, α_2 and α_3 are functions of the estimated ω_{ij} from equations $V_{3.0}$, $V_{3.1}$, $V_{3.2}$ and $V_{3.3}$. The median V_3/P is 0.924, which is close to the LIM3 hypothesized value of 1.

Panel C of table 4 contains the results from linear regressions of price on the implied value, RI, book value and capital expenditures in 1996, and the implied price coefficients. In the simple regression of price on V_3, V_3 has a coefficient of only 0.324; this is significantly less than 1. While statistically significant and consistent with H_{2c}, the adjusted R^2 is only 0.335. V_3 explains approximately 70 percent of the cross-sectional variation in stock price explained by book value.

The results of a multiple regression of price on RI, book value and capital expenditures are inconsistent with H_{2c}. The coefficients on RI, book value and capital expenditures are significantly greater than the coefficients implied by LIM3 (0.176, 0.804 and −3.766, respectively). That is, the weightings implied by the estimated LIM differ greatly from the weightings implied by market price.

LIM4

As a final test using the LIMs to estimate future RI, I examine the usefulness of including an additional source of information into the information dynamics. Contrary to H_{1d}, table 5 shows that, for the median firm, order backlog does not translate into an increase in RI in the following year. This implies that order backlog should not be valued after controlling for current book value and residual income. The autoregressive parameter on order backlog is 0.998. However, adding an additional information variable increases the complexity of the pricing coefficients considerably. Further, the coefficient estimates are likely to be very noisy. Because the effect is small, including additional information such as order backlog is unlikely to improve the accuracy of value estimates for most firms.[23]

Conservatism Parameters

To test whether the failure of the LIMs to describe the effects of conservatism is due to the inclusion of nonconservative firms in the sample (see Stober 1996), I test the relationship between ω_{12} and ω_{13} (the LIM-based conservatism parameters) and C (the market-based conservatism parameter).

Tables 6 and 7 do not support hypotheses H_{3a} and H_{3b}. Panel A of table 6 presents the distribution of estimated LIM2 parameters for the 25 percent of firms with the most conservative accounting (based on C). The median book value conservatism parameter, ω_{12}, for these firms remains negative. If C represents accounting conservatism, then the negative conservatism parameter estimate (ω_{12}) in the full sample is not due to that sample's inclusion of nonconservative and conservative firms.

Panel A of table 7 confirms the previous finding. The book value parameter estimate is negative for more than 60 percent of the firms, suggesting that LIM3 does not accurately describe the book value effect of conservatism. The median estimate of the income effect of conservatism is −0.107, which is statistically significant. However, approximately the same percentage of firms have negative ω_{13} estimates, whether drawn from the full sample or the conservative sample. This suggests that the negative parameter estimates may not be due to accounting conservatism.

Finally, I calculate both Pearson and Spearman correlations between the LIM-based conservatism parameters and the market-based conservatism parameters for both LIM2 and

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[23] In analysis not reported in the table, order backlog is added to each of the models, providing similar results.

TABLE 5
The Distribution of Parameter and Value Estimates Under LIM4

Panel A: RI Regression:

$$
\begin{aligned}
RI_{t+1} &= \omega_{10} + \omega_{11} RI_t + \omega_{12} bv_t + \omega_{13} bklog_t + \varepsilon_{1t+1}{}^{a} \\
bv_{t+1} &= \omega_{22} bv_t + \varepsilon_{2t+1} \\
bklog_{t+1} &= \omega_{33} bklog_t + \varepsilon_{3t+1}
\end{aligned}
$$

Parameters	*Percentile* 20th	40th	50th	60th	80th
RI time series:					
ω_{10}	−0.048	0.000	0.019	0.070	0.664
ω_{11}	−0.005	0.002	0.013	0.036	0.112
ω_{12}	−0.075	−0.010	−0.004	−0.001	0.005
ω_{13}	−0.014	−0.001	0.000	0.002	0.028
bv time series:					
ω_{22}	0.872	1.031	1.067	1.099	1.184
bklog time series:					
ω_{33}	0.682	0.921	0.998	1.083	1.334

Panel B: Value/Price and Book/Price Comparisons[b]

Variables	20th	40th	50th	60th	80th
V_4/P	0.184	0.484	0.648	0.836	1.472
bv/P	0.304	0.466	0.551	0.661	0.992

Panel C: Implied Price Coefficients and Price Level Regressions[c]

Dependent Variable	*Independent Variables* *Intercept*	$V_4{}^{d}$	RI_t	bv_t	$bklog_t$	*Adjusted* R^2
$Price_t$	17.205	0.150	—	—	—	
	(0.001)	(0.001)				0.176
$Price_t$	15.943	—	—	—	0.042	
	(0.001)				(0.001)	0.025
$Price_t$	10.812	—	—	0.520	—	
	(0.001)			(0.001)		0.468
$Price_t$	19.329	—	0.614	—	—	
	(0.001)		(0.001)			0.206
$Price_t$	14.289	—	0.278	0.300	−0.002	
	(0.001)		(0.438)	(0.001)	(0.861)	0.326
Implied Price Coefficients[e]	0.146	—	0.011	0.920	0.000	—

---

[a] Panel A presents the cross-sectional distribution of coefficient estimates from the time-series residual income (RI) regressions of LIM4, estimated by firm. The five columns are the 20th to the 80th percentile estimates of the parameters. This panel includes the 924 firms with nonzero order backlog for at least one-quarter of the years they were in the sample.

[b] Panel B presents the distribution of value estimates (V_4) divided by market price (P) and book value (bv) divided by market price, as of the end of fiscal year 1996. There are 664 firms with the required data available for this year.

[c] Panel C presents the price coefficients obtained by regressing price on V_4, RI, bv and/or bklog and the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A). P-values are presented in parentheses. They are determined by comparing the price coefficients with their implied values. The reported regression coefficients are obtained after removing up to eight influential observations with Cook's distance greater than 2.

[d] $V_4 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2) bv_t + \alpha_3 bklog_t$, where α_0 to α_3 are calculated using the firm-specific ω estimates from V_3 and equations $V_{3.0}$, $V_{3.1}$, $V_{3.2}$ and $V_{3.3}$, and setting $\omega_{23} = 0$. The significance of the intercept and slope coefficients in the regression of price on V are tested against their respective theoretical values of zero and one.

[e] These are the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A), the sample median risk-adjusted discount rate of 11.78 percent, and the modified equations $V_{3.0}$, $V_{3.1}$, $V_{3.2}$ and $V_{3.3}$.

TABLE 6
The Distribution of Parameter and Value Estimates Under LIM2 for the Conservative Subsample

Panel A: RI Regression: $RI_{t+1} = \omega_{10} + \omega_{11}RI_t + \omega_{12}bv_t + \varepsilon_{1t+1}$[a]

$bv_{t+1} = \omega_{22}bv_t + \varepsilon_{2t+1}$

	Percentile				
Parameters	*20th*	*40th*	*50th*	*60th*	*80th*
RI time series:					
ω_{10}	−0.045	0.013	0.070	0.192	1.265
ω_{11}	−0.001	0.019	0.035	0.052	0.196
ω_{12}	−0.092	−0.022	−0.006	0.000	0.003
bv time series:					
ω_{22}	0.902	1.021	1.051	1.077	1.152

Panel B: Value/Price and Book/Price Comparisons[b]

Variables	*20th*	*40th*	*50th*	*60th*	*80th*
V_2/P	−0.021	0.207	0.367	0.513	1.020
bv/P	0.201	0.291	0.321	0.379	0.518

Panel C: Implied Price Coefficients and Price Level Regressions[c]

Dependent	*Independent Variables*				
Variable	*Intercept*	V_2[d]	RI_t	bv_t	*Adjusted* R^2
$Price_t$	23.128	0.417	—	—	
	(0.001)	(0.001)			0.298
$Price_t$	18.357	—	—	0.917	
	(0.001)			(0.910)	0.455
$Price_t$	33.669	—	0.949	—	
	(0.001)		(0.002)		0.023
$Price_t$	19.858	—	0.468	0.797	
	(0.001)		(0.421)	(0.015)	0.458
Implied Price Coefficients[e]	0.549	—	0.032	0.923	—

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[a] Panel A presents the cross-sectional distribution of coefficient estimates from the time-series residual income (RI) regressions of LIM2, estimated by firm. The five columns are the 20th to the 80th percentile estimates of the parameters. This panel consists of the 25 percent of firms with the most conservative accounting as estimated by the market-based parameter, C. There are 594 firms in this panel.

[b] Panel B presents the distribution of value estimates (V_2) divided by market price (P) and book value (bv) divided by market price, as of the end of fiscal year 1996. There are 469 firms with the required data available for this year.

[c] Panel C presents the price coefficients obtained by regressing price on V_2, RI and/or bv and the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A). P-values are presented in parentheses. They are determined by comparing the price coefficients with their implied values. The reported regression coefficients are obtained after removing up to one influential observation with Cook's distance greater than 2.

[d] $V_2 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2) bv_t$, where α_0 to α_2 are calculated using the estimated ω and equations $V_{2.0}$, $V_{2.1}$ and $V_{2.2}$. The significance of the intercept and slope coefficients in the regression of price on V are tested against their respective theoretical values of zero and one.

[e] These are the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A), the sample median risk-adjusted discount rate of 11.78 percent, and equations $V_{2.0}$, $V_{2.1}$ and $V_{2.2}$.

TABLE 7
The Distribution of Parameter and Value Estimates Under LIM3 for the Conservative Subsample

Panel A: RI Regression:

$$RI_{t+1} = \omega_{10} + \omega_{11}RI_t + \omega_{12}bv_t + \omega_{13}capx_t + \varepsilon_{1t+1}{}^{a}$$

$$bv_{t+1} = \omega_{22}bv_t + \omega_{23}capx_t + \varepsilon_{2t+1}$$

$$capx_{t+1} = \omega_{33}capx_t + \varepsilon_{3t+1}$$

	Percentile				
Parameters	*20th*	*40th*	*50th*	*60th*	*80th*
RI time series:					
ω_{10}	−0.128	0.180	0.563	1.035	2.718
ω_{11}	−0.210	0.015	0.107	0.177	0.383
ω_{12}	−0.214	−0.082	−0.046	−0.004	0.096
ω_{13}	−0.784	−0.271	−0.107	0.011	0.411
bv time series:					
ω_{22}	0.566	0.695	0.735	0.769	0.835
capx time series:					
ω_{33}	0.879	0.965	0.999	1.027	1.085

Panel B: Value/Price and Book/Price Comparisons[b]

Variables					
V_3/P	−0.154	0.417	0.646	1.014	2.413
bv/P	0.217	0.317	0.381	0.441	0.646

Panel C: Implied Price Coefficients and Price Level Regressions[c]

Dependent Variable	*Independent Variables*					
	Intercept	$V_3{}^{d}$	RI_t	bv_t	$capx_t$	*Adjusted* R^2
$Price_t$	17.904	0.300	—	—	—	
	(0.001)	(0.001)				0.307
$Price_t$	24.982	—	—	—	0.016	
	(0.001)				(0.001)	0.192
$Price_t$	18.268	—	—	0.968	—	
	(0.001)			(0.068)		0.501
$Price_t$	28.607	—	2.120	—	—	
	(0.001)		(0.004)			0.028
$Price_t$	12.549	—	0.771	1.215	0.008	
	(0.001)		(0.155)	(0.001)	(0.001)	0.566
Implied Price Coefficients[e]	4.728	—	0.106	0.867	−5.938	—

---

[a] Panel A presents the cross-sectional distribution of coefficient estimates from the time-series residual income (RI) regressions of LIM3, estimated by firm. The five columns are the 20th to the 80th percentile estimates of the parameters. This panel consists of the 25 percent of firms with the most conservative accounting as estimated by the market-based parameter, C. There are 590 firms in this panel.

[b] Panel B presents the distribution of value estimates (V_3) divided by market price (P) and book value (bv) divided by market price, as of the end of fiscal year 1996. There are 452 firms with the required data available for this year.

[c] Panel C presents the price coefficients obtained by regressing price on V_3, RI, bv and/or capx and the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A). P-values are presented in parentheses. They are determined by comparing the price coefficients with their implied values. The reported regression coefficients are obtained after removing up to one influential observation with Cook's distance greater than 2.

[d] $V_3 = \alpha_0 + \alpha_1 RI_t + (1 + \alpha_2) bv_t + \alpha_3 capx_t$, where α_0 to α_3 are calculated using the firm-specific ω estimates and equations $V_{3.0}$, $V_{3.1}$, $V_{3.2}$ and $V_{3.3}$. The significance of the intercept and slope coefficients in the regression of price on V are tested against their respective theoretical values of zero and one.

[e] These are the equilibrium price coefficients implied by the median parameter estimates of the information dynamics (panel A), the sample median risk-adjusted discount rate of 11.78 percent, and equations $V_{3.0}$, $V_{3.1}$, $V_{3.2}$ and $V_{3.3}$.

LIM3. The Pearson correlations for LIM2 are statistically significant. However, the Spearman correlations are significant but in the wrong direction. The findings for LIM3 are similar. Altogether, the findings are inconsistent with the hypothesized LIMs capturing the effects of conservatism.

VI. CONCLUSION

This study describes several different attempts to implement residual income (RI) valuation within the confines of alternative linear information dynamics. If the theory is to be used as the basis for estimating firm value, then an internally consistent link between current information and future RI is necessary. Linear models of the link between current and future information ensure consistency and are an integral component of accounting-based valuation. Recent studies modify the linear information models in an attempt to better approximate economic conditions. These modifications frequently lead to internal inconsistencies.

I find that a simple time-series model of RI does not require assumptions that are internally inconsistent, but evidence suggests that this time series is nonstationary. I also find that the theoretical models of conservatism fail to accurately characterize the time series of RI. Although the time series of RI is affected by accounting conservatism, better models of the effects are needed. All models examined here tend to understate firm value and a large portion of the market's expectations of future RI is unaccounted for by these proposed time-series models. Although the models provide information useful for estimating firm value, it appears that estimation errors are extensive and that these models provide noisy estimates of firm value. More thorough modeling of the accounting process adds to the complexity of the valuation model and appears to magnify the estimation error.

Although modifications to the information dynamics can lead to internal inconsistencies, this study provides an example of how conditioning variables can be incorporated into valuation while preserving consistency. Order backlog is included as an example of a conditioning variable. However, the results are discouraging and indicate that order backlog, on average, has a negligible impact on future RI. Caution is warranted when adding variables, since the evidence suggests this can reduce the precision of the value estimates.

Overall, my analysis suggests that the linear information dynamics that I examine do not capture aspects of the market valuation process very well. There are several possible explanations for the inadequacy of the empirical models I examine. First, there are too few observations to make precise estimates of the time-series parameters. Second, the time-series processes of accounting information are likely to be nonstationary due to changes in growth rates, accounting procedures and production technologies. This creates problems for modeling the valuation process and leaves much room for fundamental analysis.

APPENDIX

PROOF THAT DISCONNECTED EARNINGS SERIES IMPLY ARBITRAGE

Price is equal to book value plus the present value of future expected residual income (RI) (Ohlson 1990):

$$P_t = bv_t + \sum_{\tau=1}^{\infty} R^{-\tau} E(RI_{t+\tau}|\Theta_t). \qquad (A1)$$

Specifying separate, disconnected patterns for short-run and long-run future RI implies two different functional forms for the relationship between current information and expectations of future RI.

Let $S(\Theta_t,\tau)$ be the function that calculates expected RI τ periods into the future, given information set Θ_t, where τ is between 1 and T, and T is the number of periods described by the short-run dynamics. Similarly, let $L(\Theta_t,\tau)$ be the function that calculates expected RI τ periods into the future for τ greater than T. Firm value at date t can then be written as:

$$P_t = bv_t + \sum_{\tau=1}^{T} R^{-\tau} S(\Theta_t,\tau) + \sum_{\tau=T+1}^{\infty} R^{-\tau} L(\Theta_t,\tau) \qquad \text{(A2)}$$

where $R = (1 + r)$.

Taking expectations on both sides and looking ahead one period, the expected price at date $t + 1$, based on the information set Θ_t is:

$$E(P_{t+1}|\Theta_t) = E(bv_{t+1}|\Theta_t) + \sum_{\tau=1}^{T} R^{-\tau} E(S(\Theta_{t+1},\tau)|\Theta_t) + \sum_{\tau=T+1}^{\infty} R^{-\tau} E(L(\Theta_{t+1},\tau)|\Theta_t). \qquad \text{(A3)}$$

Using the clean surplus relation:

$$E(bv_{t+1}|\Theta_t) = bv_t + E(x_{t+1}|\Theta_t) - E(d_{t+1}|\Theta_t),$$

and using the definition of abnormal earnings:

$$E(bv_{t+1}|\Theta_t) = R \cdot bv_t + E(x^a_{t+1}|\Theta_t) - E(d_{t+1}|\Theta_t). \qquad \text{(A4)}$$

Taking expectations of equation (A2) and substituting equation (A4) for $E(bv_{t+1}|\Theta_t)$:

$$\begin{aligned} E(P_{t+1}|\Theta_t) &= R \cdot bv_t + E(x^a_{t+1}|\Theta_t) - E(d_{t+1}|\Theta_t) \\ &\quad + \sum_{\tau=1}^{T} R^{-\tau} E(S(\Theta_{t+1},\tau)|\Theta_t) + \sum_{\tau=T+1}^{\infty} R^{-\tau} E(L(\Theta_{t+1},\tau)|\Theta_t). \qquad \text{(A5)} \end{aligned}$$

From the law of iterated expectations, $E(E(\bullet|\Theta_{t+1})|\Theta_\tau) = E(\bullet|\Theta_\tau)$, implying:

$$E(S(\Theta_{t+1},\tau)|\Theta_\tau) = S(\Theta_t,\tau + 1) \text{ for all } \tau < T$$
$$\text{and } E(L(\Theta_{t+1},\tau)|\Theta_\tau) = L(\Theta_t,\tau + 1) \text{ for all } \tau \geq T.$$

Rearranging terms:

$$\begin{aligned} E[(P_{t+1} + d_{t+1})|\Theta_t] &= R \cdot bv_t + \sum_{\tau=0}^{T-1} R^{-\tau} S(\Theta_t,\tau + 1) \\ &\quad + R^{-T} E(S(\Theta_{t+1},T)|\Theta_t) + \sum_{\tau=T+1}^{\infty} R^{-\tau} L(\Theta_t,\tau + 1). \qquad \text{(A6)} \end{aligned}$$

All expectations drop out except $E(S(\Theta_{t+1},T)|\Theta_t)$ since $S(\Theta_t,T + 1)$ is undefined.

No arbitrage implies $E(P_{t+1} + d_{t+1}|\Theta_\tau) = R \cdot P_t$, and equation (A6) $= R \cdot$ (2):

$$R \cdot bv_t + \sum_{\tau=0}^{T-1} R^{-\tau} S(\Theta_t, \tau + 1) + R^{-T} E(S(\Theta_{t+1}, T)|\Theta_t) + \sum_{\tau=T+1}^{\infty} R^{-\tau} L(\Theta_t, \tau + 1)$$
$$= R\left[bv_t + \sum_{\tau=1}^{T} R^{-\tau} S(\Theta_t, \tau) + \sum_{\tau=T+1}^{\infty} R^{-\tau} L(\Theta_t, \tau)\right].$$

Canceling like terms:

$$E(S(\Theta_{t+1}, T)|\Theta_t) = L(\Theta_t, T + 1).$$

Therefore, if price is set using different short-run and long-run RI expectations functions, these functions must be linked such that:

$$E(S(\Theta_{t+1}, T)|\Theta_t) = L(\Theta_t, T + 1),\ E(S(\Theta_{t+2}, T)|\Theta_t) = L(\Theta_t, T + 2), \ldots,$$

or $E(P_{t+1} + d_{t+1}) \neq R\ (P_t)$.

REFERENCES

Abarbanell, J., and V. L. Bernard. 1997. Does the U.S. stock market underprice long-term abnormal earnings? Working paper, University of North Carolina at Chapel Hill.

Beaver, W., and S. Ryan. 1998. Biases and lags in book value and their effects on the ability of the book-to-market ratio to predict book return on equity. Working paper, New York University.

Bernard, V. 1994. Accounting-based valuation methods, determinants of market-to-book ratios, and implications for financial statements analysis. Working paper, University of Michigan.

Dechow, P., A. Hutton, and R. Sloan. 1998. An empirical analysis of the residual income valuation model. *Journal of Accounting and Economics*, Forthcoming.

Fama, E., and K. French. 1997. Industry cost of equity. *Journal of Financial Economics* 43 (February): 153–194.

Feltham, G., and J. Ohlson. 1995. Valuation and clean surplus accounting for operating and financial activities. *Contemporary Accounting Research* 11 (Spring): 689–732.

———, and ———. 1996. Uncertainty resolution and the theory of depreciation measurement. *Journal of Accounting Research* 34 (Autumn): 209–234.

Frankel, R., and C. M. C. Lee. 1998. Accounting valuation, market expectation and cross-sectional stock returns. *Journal of Accounting and Economics,* 25 (3): 289–319.

Garman, M., and J. Ohlson. 1980. Information and sequential valuation of assets in arbitrage-free economies. *Journal of Accounting Research* 18 (Autumn): 420–440.

Hamilton, J. 1994. *Time Series Analysis*. Princeton, NJ: Princeton University Press.

Lee, C. M. C., J. Myers, and B. Swaminathan. 1998. What is the fundamental value of the Dow? *Journal of Finance,* Forthcoming.

Myers, J. 1998. Accounting conservatism and finite firm life: Why residual income valuation estimates understate stock price. Working paper, University of Washington.

Ohlson, J. 1990. A synthesis of security valuation theory and the role of dividends, cashflows, and earnings. *Contemporary Accounting Research* 6 (Spring): 648–676.

———. 1995. Earnings, book values and dividends in security valuation. *Contemporary Accounting Research* 11 (Spring): 661–668.

Penman, S. 1997. A synthesis of equity valuation techniques and the terminal value calculation for the dividend discount model. Working paper, University of California at Berkeley.

———, and T. Sougiannis. 1998. The substitution of anticipated earnings for dividends in equity valuation. Working paper, University of Illinois.

Stober, T. 1996. Do prices behave as if accounting book values are conservative? Cross-sectional tests of the Feltham-Ohlson (1995) valuation model. Working paper, University of Notre Dame.

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Equity Valuation and Negative Earnings: The Role of Book Value of Equity

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ABSTRACT: This study provides an explanation for the anomalous significantly negative price-earnings relation using the simple earnings capitalization model for firms that report losses. We hypothesize and find that including book value of equity in the valuation specification eliminates the negative relation. This suggests that the simple earnings capitalization model is misspecified and the negative coefficient on earnings for loss firms is a manifestation of that misspecification. Furthermore, we provide evidence on three competing explanations for the role that book value of equity plays in valuing loss firms. Specifically, we investigate whether the importance of book value in cross-sectional valuation models stems from its role as (1) a control for scale differences (Barth and Kallapur 1996), (2) a proxy for expected future normal earnings (Ohlson 1995; Penman 1992), or (3) a proxy for loss firms' abandonment option (Berger et al. 1996; Barth et al. 1996; Burgstahler and Dichev 1997). Our results do not support the conjecture that the importance of book value in cross-sectional valuation stems primarily from its role as a control for scale differences. Rather, the results are consistent with book value serving as a value-relevant proxy for expected future normal earnings for loss firms in general, and as a proxy for abandonment option for loss firms most likely to cease operations and liquidate.

Key Words: *Negative earnings; Price-earnings relation misspecification; Book value of equity.*

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I. INTRODUCTION

Equity valuation models have been used extensively in accounting research to examine the value relevance of accounting data. One such valuation model is the simple earnings capitalization model. In this model, stock price is expressed as a function of earnings or the components of earnings under the assumption that earnings reflects information about expected future cash flows.[1] Typically, researchers pool earnings observations cross-sectionally to estimate the earnings capitalization model. In so doing, they assume (implicitly or explicitly) that the security price-earnings relation is both *positive* and *homogeneous* over the entire range of earnings realizations.[2]

Evidence in recent studies raises questions about the assumptions of a positive and homogeneous relation between price and earnings across profits and losses, and whether the coefficient on earnings is unbiased using the simple earnings capitalization model. Hayn (1995) separates firms into those reporting losses (hereafter, loss firms) and those reporting profits (hereafter, profit firms). She finds that the cross-sectional return-earnings relation for loss firms is much weaker than that for profit firms, and she attributes the weaker relation to the market's perception of losses as being transitory. Hayn's (1995) results suggest the price-earnings relation, too, may not be homogeneous across profit and loss firms. Jan and Ou (1995) document a nonhomogeneous price-earnings relation across profit and loss firms. More strikingly, they find that the relation is reliably *negative* for loss firms. That is, the more negative is a firm's earnings per share, the higher is its stock price. This anomalous result can also be inferred from recent work by Burgstahler and Dichev (1997, table 3) and Kothari and Zimmerman (1995, table 5).

The primary purpose of our paper is to investigate and provide an explanation for the anomalous negative coefficient on earnings in the simple earnings capitalization model for loss firms. We postulate that the anomalous negative price-earnings relation for loss firms is caused by a *correlated* omitted variable problem. More specifically, we hypothesize that the simple earnings capitalization model is misspecified due to the omission of book value of equity. This hypothesis is based on several competing arguments in the literature about the role that book value of equity plays in a price-earnings specification. One possible role is purely an econometric one. Barth and Kallapur (1996) demonstrate the need to control for scale differences in a cross-sectional price-earnings specification, and book value of equity is one variable they use for this purpose.

An alternative role for book value of equity in pricing models is that it is an economically meaningful value-relevant factor in its own right. There appear to be two distinct views in the literature on the nature or source of book value of equity's value relevance.

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[1] Studies using this type of model include Bowen (1981), Daley (1984), Olsen (1985), Tse (1989), Kothari (1992) and Kothari and Zimmerman (1995).

[2] Kothari and Zimmerman (1995) evaluate return-earnings and price-earnings models. Under the assumptions that earnings follow a random walk and stock price leads earnings, they show that the coefficient on earnings is biased toward zero in the return model because the model suffers from an error-in-variables problem. (Current earnings contains both a surprise to the market and a "stale" component that the market has anticipated. The stale component is irrelevant for explaining current returns and thus constitutes an error in the independent variable for the return model.) However, in the price model the coefficient on earnings is *unbiased* since anticipated future earnings, which are reflected in stock price but omitted from the simple earnings capitalization model, are *uncorrelated* with current earnings under their maintained hypothesis that earnings follows a random walk process. While Kothari and Zimmerman (1995) note that omitting anticipated future earnings would reduce the explanatory power of the simple earnings capitalization model, it would not bias the coefficient on current earnings (given their assumptions).

Consistent with viewing the firm as a going concern, Ohlson (1995) and Penman (1992) argue that book value proxies for expected future normal earnings. Alternatively, Burgstahler and Dichev (1997), Berger et al. (1996) and Barth et al. (1996) argue that the value relevance of book value stems from its role as a proxy for adaptation or abandonment value.[3] Omission of book value of equity in the simple earnings capitalization model, either in its possible role as a control for scale differences or as a value-relevant attribute, will induce a negative bias in the coefficient on earnings if book value is *positively* correlated with stock price but *negatively* correlated with earnings for loss firms.

We find that when stock price is regressed on earnings for loss firms, the coefficient on earnings is reliably negative in 16 of the 18 years in our study. This is consistent with the findings reported by Jan and Ou (1995). When we augment the simple earnings capitalization model with book value of equity, the coefficient on earnings becomes either positive (often significantly so) or insignificantly different from zero for each year in our 18-year sample period. The mean of the coefficients on earnings over 18 sample years is also significantly positive. This provides strong evidence that the simple earnings capitalization model is misspecified due to the omission of book value, and the omission induces a *negative* bias in the coefficient on earnings for loss firms. Hence, this supports the conclusion that the anomalous negative coefficient on earnings for loss firms can be explained by the omission of book value of equity in the simple earnings capitalization model. Moreover, we show that omitting book value of equity induces a *positive* bias for profit firms. These results are inconsistent with the conclusion reached by Kothari and Zimmerman (1995) (based on their assumptions) that the coefficient on earnings in the simple earnings capitalization model is unbiased.

A second objective of our research is to provide evidence on the role that book value of equity plays in equity valuation for loss firms. Initially, we examine several implications of the argument that book value of equity primarily serves the role of a control for scale differences in the price-earnings relation (Barth and Kallapur 1996). Our results generally are not consistent with book value primarily being a control for scale differences. For instance, augmenting the empirical model of price regressed on earnings and book value with other proxies for scale (about which there is no *a priori* reason to believe these they might also be value-relevant factors) does not materially affect the significance of the coefficient on book value.

We further investigate two alternative value-relevant-factor-based explanations for the role that book value of equity plays in valuation. Specifically, we investigate whether the importance of book value stems from its role as (1) a proxy for loss firms' expected future normal earnings (Ohlson 1995; Penman 1992) or (2) a proxy for loss firms' abandonment option (Berger et al. 1996; Barth et al. 1996; Burgstahler and Dichev 1997). We find that replacing book value of equity with the proxies for both expected future earnings and abandonment value eliminates the anomalous negative price-earnings relation (as book value does alone).[4] This suggests that book value plays these two roles in equity valuation. To better understand these two roles and identify conditions where one role might be more important than the other, we analyze subsets of loss firms where we have *a priori* predictions regarding the relative importance of these two roles. For example, we compare firms that survive for at least ten years after reporting a loss with those that liquidate or go bankrupt in no more than two years after reporting a loss. For surviving firms, we predict and find that expected future normal earnings statistically dominates abandonment value with regard to explaining stock prices. For firms approaching bankruptcy or liquidation, we predict that abandonment value dominates expected future normal earnings. For these nonsurviving firms, we find that both expected future normal earnings and abandonment value are significant and that neither dominates in terms of explanatory power. However, the coefficient on abandonment value is significantly larger for nonsurviving firms vis-à-vis surviving firms. These results are consistent with book value of equity serving as a proxy for expected future normal earnings for loss firms in general, and as a proxy for abandonment value for loss firms most likely to cease operations and liquidate.

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[3] Abandonment value is akin to the value from liquidating the entity, while adaptation value is somewhat more general and reflects the value of a firm's net resources in their next best alternative use. Adaptation value can include internal redeployments of resources including restructurings and external adaptations such as sell-offs, spin-offs, divestitures and, in the extreme, liquidation. In this paper, we use book value of equity as a proxy for either or both of these theoretical concepts since, as we discuss in the conclusions section, it is very difficult to develop separate empirical proxies.

[4] Our proxy for expected future normal earnings is cost of capital times beginning-of-year book value, and our proxy for abandonment value is based on Berger et al.'s (1996) results for disposals of discontinued operations.

Our paper contributes to the literature in at least two ways. First, we demonstrate that the simple earnings capitalization model is misspecified due to the omission of book value of equity. More importantly, we demonstrate that omitting book value induces a material *bias* in the coefficient on earnings. Recent studies assert that both earnings and book value of equity are relevant for valuation (Easton and Harris 1991; Ohlson 1995; Berger et al. 1996; Burgstahler and Dichev 1997; Barth et al. 1996). These studies imply that the simple earnings capitalization model suffers from an omitted variable problem, but they do not suggest that the coefficient on earnings is *biased* due to the omission of book value of equity. In fact, whether the coefficient on earnings is biased in the simple earnings capitalization model is relatively unexplored in the literature. Our results provide evidence that omitting book value of equity in the simple earnings capitalization model induces a *downward* bias in the earnings coefficient for loss firms and an *upward* bias for profit firms. We believe it is important to explicitly document the biases in the coefficient on earnings in the simple earnings capitalization model because researchers often rely on the coefficient on earnings from that model to make inferences about the value relevance (or irrelevance) of earnings or earnings components. Our results suggest that researchers' conclusions regarding the coefficient on earnings using the simple earnings capitalization model are likely overstated (understated) depending on the proportion of profit (loss) firms in the sample.

A second contribution of our research is to provide new evidence on book value's role as a value-relevant factor in the presence of losses. Extant literature (Berger et al. 1996; Barth et al. 1996) typically uses book value of equity only as a proxy for abandonment or liquidation value, which is the lower bound on a firm's value. We examine the role of book value as a proxy for expected future normal earnings, in addition to its role as a proxy for abandonment or liquidation value. The Ohlson (1995) model suggests that book value of equity reflects the present value of expected future normal earnings since a firm can be expected to generate a return on its net assets that equals its expected cost of equity capital. The role of book value of equity as a proxy for expected future normal earnings is naturally heightened for loss firms because negative earnings are typically not informative about future operating results. Negative earnings cannot be sustained indefinitely; a firm must become profitable or it will cease being a viable entity. In the event of liquidation, book value is a natural proxy for liquidation value. Thus, it is reasonable to hypothesize that for loss firms, book value of equity can provide information about expected future normal earnings and/or about liquidation value. Our evidence suggests that in the presence of losses, the market acts as if it relies on book value of equity *both* as a proxy for expected future normal earnings *and* as a proxy for abandonment value. The relative importance of these two roles depends on whether the firm is more likely to survive or cease operations and liquidate.

The remainder of the paper is organized as follows. Section II confirms the negative price-earnings relation for loss firms. In section III we motivate viewing book value of equity as a correlated omitted variable, present results supporting that hypothesis, and demonstrate the misspecification of the simple earnings capitalization model. Section IV investigates the alternative explanations for the role that book value of equity plays in the price-earnings relation. We summarize our results and discuss some implications and limitations in section V.

II. EVIDENCE ON THE NEGATIVE PRICE-EARNINGS RELATION FOR LOSS FIRMS

Sample Selection and Data

We obtain all necessary data from the Compustat annual and quarterly Primary, Secondary, Tertiary, Full Coverage, and Research files. These data sets span the 20-year period from 1974 to 1993. We include the Research file to mitigate a survivorship bias that results from examining only firms on the active Compustat files.

We identify 90,171 firm-year observations with positive book value of equity[5] for the period 1975 through 1992 and, as defined below, separate loss observations (n = 22,495) from profit observations (n = 67,676).[6] We delete observations from the profit and loss groups where (1) beginning-of-year book value of equity is missing (total = 9,331), (2) stock price three months after the fiscal year-end is missing (total = 9,424), (3) the cumulative share adjustment factor is less than 0.1 or the total number of shares outstanding adjusted for stock splits and dividends is less than 10,000 (total = 1,040), and (4) stock price or earnings per share is three standard deviations away from its respective mean (total = 799).[7] The selection process yields a sample of 15,843 firm-years with negative earnings (i.e., loss firms) and 53,734 firm-years with positive earnings (profit firms).

All variables are measured on a per-share basis and adjusted for stock splits and stock dividends. Cum-dividend price (P_t) is the firm's stock price three months after the end of fiscal year t (Compustat quarterly data item #14) plus its dividends per share for year t (annual data item #26), where year t is the event year. We compute earnings on a per-share basis (X_t) as follows. The numerator is year t income available to common stockholders (i.e., net income minus preferred dividends, Compustat annual data items #172 minus #19) and the denominator is the total number of shares outstanding (annual data item #25). We refer to X_t as bottom-line earnings. Finally, book value of equity per share (BV_{t-1}) is annual data item #60 as of the end of year t − 1 divided by the total number of shares outstanding. We discuss our use of BV_{t-1} below.

Table 1 presents descriptive statistics for our sample of 15,843 loss firms. There is an almost monotonic increase in the frequency of firms with negative earnings over the sample period. To provide a benchmark, we plot in figure 1 the annual percentages of loss firms

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[5] As a diagnostic, we also allow book value of equity to be negative in the first phase of our analysis and continue to observe the negative price-earnings relation with the simple earnings capitalization model. In our subsequent analyses of model misspecification and the role of book value of equity, cases of negative book value are eliminated. We hypothesize that book value of equity proxies for firm size, abandonment value, or expected future normal earnings and, at least for the first two of these roles, negative book values have no economic meaning. Over our sample period, 14 percent of loss firms (annual range of 5 to 16 percent) and 1 percent of profit firms have negative values for book value of equity.

[6] We exclude 1974 from the sample period because we require a value for beginning-of-year book value of equity, and we exclude 1993 since we use stock price as of three months after the fiscal year-end.

[7] Regarding (3), cumulative adjustment factors of less than 1.0 mean firms combine shares to form one new share. Such "reverse splits" boost share price and magnify per share losses for loss firms, generating outliers that tend to create the appearance of a strong negative correlation between losses and stock prices. For our primary analyses, we use a cumulative adjustment factor cutoff of less than 0.1, which means we attempt to avoid small denominator problems by deleting the most severe cases of such reverse splits.

TABLE 1
Descriptive Statistics for the Sample of Loss Firms

		P_t^a				X_t^a				BV_{t-1}^a				TRX_t^a			
Year	*Obs.*	*Mean*	*Q1*[b]	*Median*	*Q3*[b]	*Mean*	*Q1*[b]	*Median*	*Q3*[b]	*Mean*	*Q1*[b]	*Median*	*Q3*[b]	*Mean*	*Q1*[b]	*Median*	*Q3*[b]
75	299	4.81	1.70	3.00	5.63	−1.41	−1.50	−.68	−.28	10.59	3.76	7.24	12.98	−.47	−.47	0	0
76	204	3.45	1.25	2.26	4.56	−1.42	−1.87	−.79	−.28	8.68	3.18	6.25	10.94	−.47	−.46	0	0
77	198	5.22	1.61	3.13	6.00	−1.35	−1.83	−.63	−.22	10.01	3.65	6.12	11.69	−.50	−.60	0	0
78	147	4.36	2.00	3.75	6.29	−1.36	−1.52	−.71	−.26	7.94	3.12	6.04	10.12	−.40	−.32	0	0
79	170	5.96	2.13	3.63	6.88	−1.47	−2.15	−.93	−.28	10.40	3.85	6.82	12.50	−.53	−.57	0	0
80	215	7.82	2.75	5.13	8.85	−1.79	−2.39	−.93	−.35	12.30	3.63	7.74	14.65	−.73	−.61	0	0
81	517	4.55	1.13	3.00	5.88	−1.10	−1.24	−.46	−.13	7.29	1.06	3.85	9.16	−.34	−.11	0	0
82	1,048	6.63	1.38	3.97	8.50	−1.06	−1.27	−.44	−.12	7.40	.82	3.02	8.34	−.21	−.05	0	0
83	984	6.38	1.54	4.00	8.35	−1.04	−1.21	−.43	−.13	6.06	.70	2.74	7.66	−.23	−.05	0	0
84	1,050	4.65	1.13	3.00	6.00	−1.08	−1.14	−.41	−.15	4.81	.74	2.22	5.81	−.29	−.11	0	0
85	1,257	5.47	1.25	3.25	7.25	−1.00	−1.17	−.42	−.14	4.98	.71	2.47	6.32	−.33	−.17	0	0
86	1,340	5.97	1.38	3.50	7.75	−1.01	−1.18	−.45	−.16	5.04	.70	2.47	6.46	−.28	−.19	0	0
87	1,363	4.76	1.00	2.63	5.88	−.85	−.94	−.37	−.12	4.28	.58	2.02	5.65	−.22	−.09	0	0
88	1,322	4.29	.88	2.41	5.75	−.78	−.88	−.38	−.12	4.06	.66	2.05	4.99	−.16	−.08	0	0
89	1,379	4.26	.75	2.38	5.88	−.87	−.99	−.39	−.13	4.36	.63	2.19	5.80	−.23	−.15	0	0
90	1,438	3.86	.69	2.25	5.25	−.95	−1.14	−.41	−.14	4.87	.64	2.28	6.25	−.22	−.17	0	0
91	1,469	5.77	1.13	3.25	7.83	−1.03	−1.23	−.47	−.17	5.32	.70	2.72	7.19	−.29	−.23	0	0
92	1,443	6.98	1.69	4.38	9.00	−1.07	−1.33	−.51	−.18	5.66	.86	2.97	7.36	−.49	−.41	−.02	0
Pooled	15,843	5.30	1.17	3.13	6.88	−1.01	−1.19	−.44	−.15	5.57	.78	2.78	7.05	−.29	−.17	0	0

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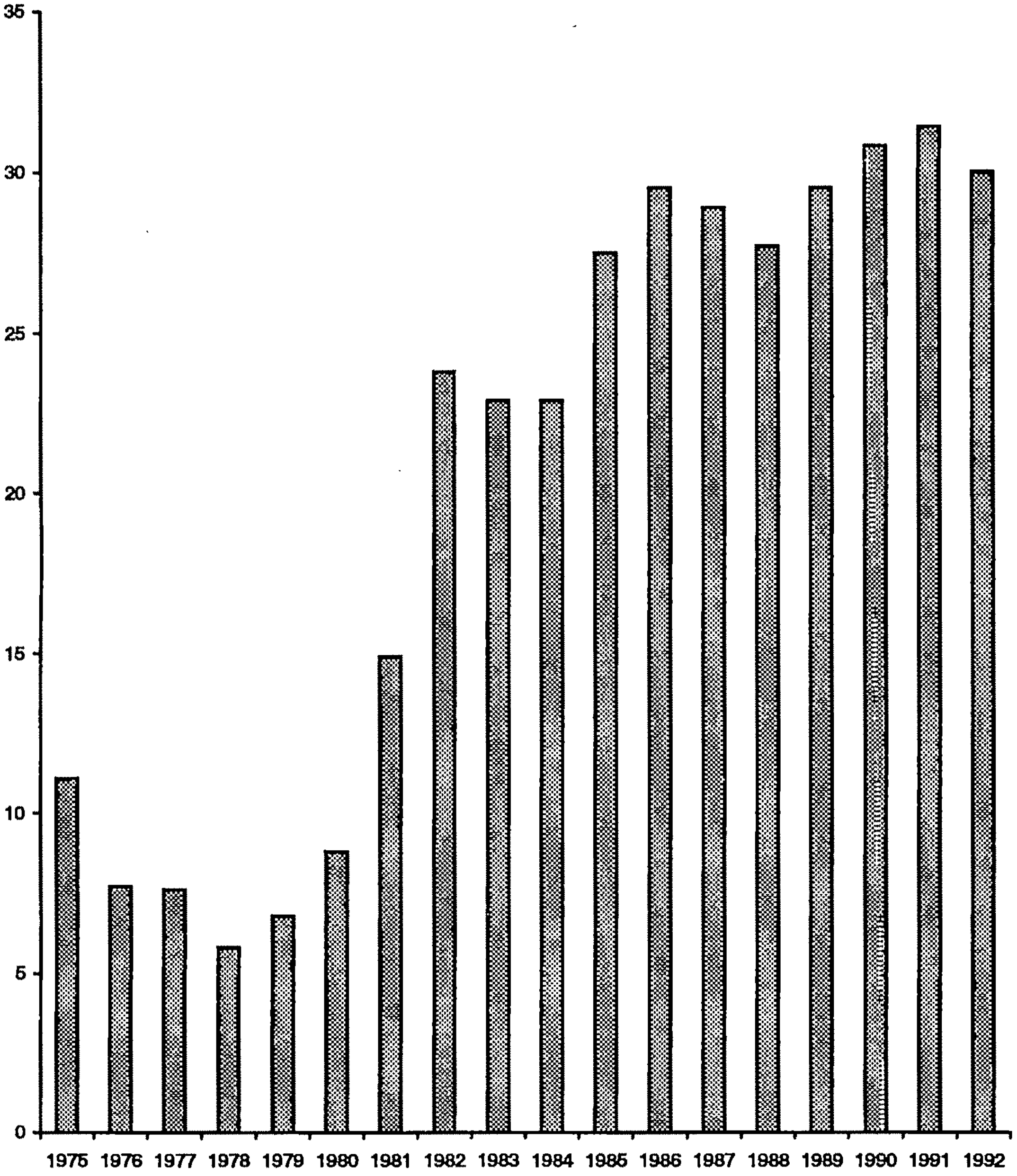
[a] Variable definitions: P_t = stock price three months after fiscal year t (Compustat quarterly data item #14) plus dividends per share in year t (annual data item #26) adjusted for stock splits and dividends appropriate for the third month in fiscal year t + 1; X_t = bottom-line earnings (income available to stockholders, annual data item #172, minus preferred dividends, annual data item #19) divided by total number of shares outstanding (annual data item #25); BV_{t-1} = book value of equity at the end of the year t − 1 (annual data item #60) divided by total number of shares outstanding adjusted for stock splits and dividends; TRX_t = transitory earnings per share = $X_t - CX_t$, where CX_t (core earnings per share) = income before extraordinary items and discontinued operations available for common stockholders (annual data item #237) minus special items (annual data item #17) adjusted for income taxes, using a 40 percent tax rate, divided by total number of shares outstanding adjusted for stock splits and dividends.

[b] Q1 stands for lower quartile, and Q3 upper quartile.

FIGURE 1
Percent of Compustat Firms Reporting Negative Bottom-Line Earnings During 1975–1992



Source: 1993 Compustat PST, Full Coverage, and Research files. Percentage is calculated based on our sample of loss firms and profit firms. See table 1 for the definition of bottom-line earnings.

in the Compustat population. Figure 1 also reveals a general increase in the proportion of Compustat firms reporting negative earnings. In particular, the percentage of loss firms in the population increases from a range of 6 to 15 percent in the 1975–1981 period to a range of 28 to 31 percent from 1985 to 1992. These percentages highlight both the pervasiveness of negative earnings and their growing significance. Similar patterns are apparent in our sample and in the Compustat population when losses are measured based on "core earnings" (not shown), which excludes from income items that most likely are transitory in nature.[8]

Also note in table 1 that the average magnitude of negative earnings is highest during the 1975–1980 period. The magnitude then falls sharply (to about the average for the entire sample period) at the same time that the frequency of losses rises sharply. The magnitude of average losses falls again in the 1987–1990 period before rising during the recession years of 1991–1992. A somewhat similar pattern is apparent in table 1 for the transitory components of earnings (TRX_t) included in our sample of loss firms' bottom-line earnings. Note that mean TRX_t is negative each year, while the median is zero. The mean and median bottom-line earnings amount is more negative than TRX in every year. That is, core earnings is negative for virtually the entire sample of firms having negative bottom-line earnings. Finally, note in table 1 that average book value of equity generally falls throughout the sample period, especially after 1980.

Confirmation of a Negative Price-Earnings Relation for Loss Firms

Jan and Ou (1995) run the following simple earnings capitalization model separately for profit firms and loss firms (we omit firm-specific subscripts throughout):

$$P_t = \alpha + \beta X_t + \varepsilon_t \quad (1)$$

where P_t is cum-dividend stock price at time t, and X_t is earnings per share in period t.[9] For profit firms, Jan and Ou (1995) find the expected positive relation between prices and earnings in each of their 19 sample years. However, they find the "bewildering phenomenon" of a *negative* coefficient on earnings in all 19 years for loss firms. Except for one year, all of the negative coefficients they report are significant at conventional levels.

We replicate Jan and Ou's (1995) result on our sample of loss firms using equation (1), i.e., the simple earnings capitalization model, over the 1975–1992 period and using our earnings variable (i.e., bottom-line earnings). The left-hand columns in table 2 headed "Loss Firms" report our results, which take two forms: annual cross-sectional regressions, and the mean across the 18 annual regressions. An analysis of the annual regressions reveals the presence of heteroscedasticity as indicated by the White (1980) statistic (details not shown). Accordingly, for our regression analyses we base statistical inferences on White's (1980) t-statistics that are shown in parentheses in the tables throughout the paper. With respect to the overall mean effect, we aggregate coefficient values from the 18 annual regressions into a sampling distribution, and evaluate their means using a simple t-test.

Table 2 reports that the coefficients on earnings for loss firms are negative for all years examined. Except for 1978 and 1979, the coefficients are significant at conventional levels (two-tailed tests). Moreover, the negative coefficient on earnings is robust to various sensitivity checks. First, we substitute core earnings for bottom-line earnings and ex-dividend stock price for cum-dividend price, and we find results (not detailed here) that are virtually

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[8] Core earnings is defined as income before extraordinary items, discontinued operations, cumulative effects of accounting changes, and tax-adjusted special items.

[9] Jan and Ou (1995) use stock price on the last trading day of the third month after the end of fiscal year t, and define X_t as earnings per share before extraordinary items and discontinued operations in year t.

TABLE 2
Coefficient Estimates from Regressing Price on Earnings

$$P_t = \alpha + \beta X_t + \varepsilon_t \qquad (1)$$

	Loss Firms				Profit Firms				All Firms			
Year	Obs.	α	β	Adj. R^2	Obs.	α	β	Adj. R^2	Obs.	α	β	Adj. R^2
75	299	3.33 (7.36)**	−1.05 (−2.62)**	.11	2,377	2.71 (13.78)**	6.45 (29.63)**	.57	2,676	6.36 (21.17)**	3.51 (12.10)**	.32
76	204	2.88 (11.02)**	−.40 (−3.10)**	.04	2,443	1.73 (8.28)**	6.96 (39.67)**	.58	2,647	4.87 (13.83)**	4.84 (17.13)**	.44
77	198	3.74 (8.02)**	−1.10 (−3.40)**	.10	2,412	2.30 (8.81)**	6.30 (28.35)**	.58	2,610	5.39 (14.58)**	4.33 (15.05)**	.41
78	147	4.09 (14.96)**	−.20 (−1.60)	.01	2,393	2.96 (11.84)**	5.83 (29.92)**	.56	2,540	5.19 (10.05)**	4.58 (12.87)**	.47
79	170	5.58 (6.35)**	−.27 (−.77)	.00	2,316	3.89 (15.41)**	4.50 (26.92)**	.55	2,486	5.64 (22.78)**	3.73 (24.87)**	.47
80	215	6.20 (8.78)**	−.90 (−3.19)**	.05	2,221	5.03 (11.32)**	6.48 (20.59)**	.48	2,436	9.02 (19.79)**	4.50 (14.96)**	.35
81	517	3.60 (11.41)**	−.87 (−3.07)**	.10	2,943	3.64 (14.42)**	5.27 (28.14)**	.47	3,460	6.48 (19.47)**	3.51 (12.91)**	.33
82	1,048	4.56 (16.34)**	−1.95 (−7.37)**	.10	3,338	5.73 (29.75)**	6.59 (35.97)**	.53	4,386	9.52 (44.98)**	3.44 (16.32)**	.25
83	984	4.92 (20.50)**	−1.39 (−7.32)**	.10	3,320	5.05 (25.62)**	7.46 (40.20)**	.58	4,304	9.45 (44.42)**	3.94 (18.21)**	.32
84	1,050	3.57 (21.28)**	−1.00 (−7.34)**	.15	3,539	5.32 (18.23)**	6.97 (25.22)**	.57	4,589	9.08 (34.57)**	3.90 (13.78)**	.35
85	1,257	4.04 (21.40)**	−1.43 (−8.72)**	.11	3,307	7.82 (14.23)**	7.56 (14.44)**	.52	4,564	10.68 (50.68)**	5.13 (18.88)**	.39

(Continued on next page)

TABLE 2 (Continued)

$$P_t = \alpha + \beta X_t + \varepsilon_t \qquad (1)$$

	Loss Firms				Profit Firms				All Firms			
Year	*Obs.*	α	β	*Adj. R^2*	*Obs.*	α	β	*Adj. R^2*	*Obs.*	α	β	*Adj. R^2*
86	1,340	4.26 (20.71)**	−1.70 (−8.80)**	.13	3,202	7.20 (14.91)**	9.26 (18.73)**	.54	4,542	11.50 (51.15)**	5.52 (18.36)**	.36
87	1,363	3.43 (21.75)**	−1.56 (−9.99)**	.13	3,349	5.79 (14.41)**	7.95 (18.77)**	.50	4,712	9.08 (45.47)**	5.10 (18.41)**	.36
88	1,322	3.10 (21.02)**	−1.54 (−8.86)**	.12	3,459	6.01 (12.52)**	7.31 (16.13)**	.53	4,781	8.23 (41.66)**	5.72 (20.22)**	.46
89	1,379	3.39 (22.87)**	−1.01 (−7.77)**	.07	3,294	5.81 (11.25)**	8.08 (17.00)**	.58	4,673	8.83 (42.06)**	5.87 (19.23)**	.48
90	1,438	3.07 (22.15)**	−.84 (−7.92)**	.06	3,237	5.33 (8.95)**	8.95 (15.55)**	.59	4,675	9.13 (46.61)**	5.73 (19.57)**	.44
91	1,469	4.58 (22.81)**	−1.16 (−7.26)**	.07	3,216	7.58 (16.57)**	9.23 (18.62)**	.51	4,685	11.66 (58.44)**	5.19 (19.05)**	.33
92	1,443	5.07 (22.77)**	1.79 (−9.45)**	.11	3,368	7.50 (13.69)**	10.45 (18.22)**	.54	4,811	12.78 (57.93)**	5.75 (18.21)**	.34
Mean	18	4.07 (18.78)**	−1.12 (−9.42)**	.09	18	5.03 (11.55)**	7.31 (20.59)**	.54	18	8.49 (15.15)**	4.68 (23.06)**	.38

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* (**) Significant at the .10 (.01) level based on White's heteroscedasticity-corrected standard errors for annual regressions (two-tailed) or a simple t-test for the mean effect over 18 years (two-tailed).

Variable definitions: P_t = stock price three months after fiscal year t (Compustat quarterly data item #14) plus dividends per share in year t (annual data item #26) adjusted for stock splits and dividends appropriate for the third month in fiscal year t + 1; X_t = bottom-line earnings (income available to stockholders, annual data item #172, minus preferred dividends, annual data item #19) divided by total number of shares outstanding (annual data item #25); BV_{t-1} = book value of equity at the end of the year t − 1 (annual data item #60) divided by total number of shares outstanding adjusted for stock splits and dividends.

identical to those reported in table 2. Second, we re-estimate equation (1) after deleting all observations with a Compustat cumulative adjustment factor less than 1.0 since reverse stock splits could induce a negative correlation between stock price and losses unrelated to the anomaly we are investigating (see footnote 7). The regression results (not shown) are qualitatively unchanged. Finally, measuring the stock price at the end of fiscal year t, one month after the end of fiscal year t, or two months after year-end also does not qualitatively affect the results. Hence, our results confirm that the coefficient on earnings is significantly negative for loss firms using the simple earnings capitalization model.

We also estimate equation (1) using profit firms and all firms (i.e., profit and loss samples combined). These regression results are reported in the center and right-hand sets of columns of table 2, respectively. The coefficient on earnings is reliably positive in each year for profit firms and for all firms combined. Note that the positive coefficient on earnings for the combined sample masks the underlying difference in earnings coefficients of profit and loss firms that is revealed by a comparison of the coefficients in the left-hand and center columns of table 2.

III. MISSPECIFICATION OF THE SIMPLE EARNINGS CAPITALIZATION MODEL

Motivation for Viewing Book Value of Equity as a Correlated Omitted Variable

We hypothesize that the negative price-earnings relation for loss firms is caused by the omission of book value of equity from the model. We first motivate viewing this variable as a correlated omitted variable and explain why its omission is likely to bias negatively the coefficient on earnings for loss firms in equation (1). We then incorporate book value of equity into equation (1) to test whether it removes the negative coefficient on earnings.

We can motivate the inclusion of book value of equity in equation (1) from both a valuation perspective and an econometric perspective. In the former case, one way to motivate including book value in the model is to rely on the Ohlson (1995) valuation framework. Ohlson (1995) derives the following valuation model based on standard assumptions that underlie the dividend discount model, the clean surplus relation, and an assumed stochastic process for abnormal earnings:

$$P_t = y_t + \alpha_1 x_t^a + \alpha_2 v_t$$

where (using Ohlson's notation) P_t is stock price at time t, y_t is end-of-year book value of equity, x_t^a is abnormal earnings for period t, and v_t is other nonaccounting value-relevant information. The value relevance of book value in the Ohlson model rests on its role as a proxy for the present value of expected future *normal* earnings.[10] In the appendix, we derive the following model from Ohlson's (1995) abnormal earnings and end-of-period book value of equity model:

$$(P_t + d_t) = \delta_0 + \delta_1 x_t + \delta_2 y_{t-1} + \varepsilon_t. \qquad (2)$$

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[10] This point can be seen from equation (1) in Ohlson (1995):

$$P_t = y_t + \sum_{\tau=1}^{\infty} R_f^{-\tau} E(x_{t+\tau}^a)$$

which expresses stock price as the sum of book value of equity and the present value of future *abnormal* earnings. Abnormal earnings in year t equals earnings minus *normal* earnings for year t, where normal earnings is beginning-of-year book value multiplied by the cost of capital. Ohlson's (1995) equation (1), therefore, suggests that book value of equity equals the present value of expected future normal earnings.

(This is equation (5d) in the appendix. We continue to use Ohlson's notation in this section.) The dependent variable in equation (2) is cum-dividend price, and the independent variables are x_t, current period earnings, and y_{t-1}, beginning-of-year book value. Thus, both current earnings and beginning-of-year book value are included in the valuation model, and both are positive value attributes. We delete the unspecified "other information" variable, v_t in Ohlson's model, and replace it with an intercept term and an error term. The intercept allows for nonzero mean pricing effects of the omitted other information, which becomes part of the error term.

Our derived version of the Ohlson model is particularly appropriate for our purposes since it includes current earnings as opposed to abnormal earnings. As we previously discussed and documented, the negative price-earnings result for loss firms is based on current earnings in the simple earnings capitalization model. We maintain current earnings in the expanded model because our goal is to determine how the inclusion of book value of equity affects the coefficient on the earnings measure typically used in the earnings capitalization model.[11]

Also notice that we use beginning-of-year as opposed to end-of-year book value of equity in equation (2). The intuition for this is as follows. By the clean surplus relation, $y_t = y_{t-1} + x_t - d_t$ (where d_t = dividends in period t), current earnings is included as part of end-of-period book value. Hence, if y_t (instead of y_{t-1}) were in the model, earnings would effectively appear on the right-hand side of the equation twice—the first time as an independent variable, x_t, and the second time as part of the independent variable y_t. In that case, the coefficient on earnings would capture the *direct* effect of earnings on stock prices, and the coefficient on end-of-period book value would capture the *indirect* effect of earnings on stock prices through its effect on end-of-year book value. Therefore, the full pricing implications of current earnings would be captured by the sum of the coefficients on current earnings and end-of-year book value of equity. We use equation (2) to estimate the expanded price-earnings relation since it is easier to conduct tests and interpret results. The coefficient on earnings in equation (2) reflects the full pricing effect of current earnings, while the coefficient on beginning-of-year book value is not contaminated with the effects of current period earnings.

Equation (2) is especially relevant for the valuation of loss firms. When a firm reports negative earnings, book value's role as a proxy for expected future normal earnings is heightened. This is because negative earnings, unlike positive earnings, cannot persist indefinitely into the future. At some point a firm must become profitable or cease operations or be taken over. Accordingly, when current earnings are negative, they provide a less useful proxy for expected future earnings than does positive current earnings. Instead, information about expected future normal earnings for loss firms would be reflected in book value of equity.

One need not rely solely on the Ohlson model to motivate the inclusion of book value of equity in the valuation equation. Another argument supporting the valuation relevance of book value of equity is that it reflects a firm's liquidation or abandonment value (Berger et al. 1996; Barth et al. 1996; Burgstahler and Dichev 1997). In these studies, book value is used as the basis for measuring this source of value.[12] If negative earnings cause investors to assess a higher probability that a firm will abandon its resources, and if book value of equity proxies for abandonment (i.e., liquidation) value, then the valuation implications of book value of equity as a proxy for abandonment value will be relatively more important for firms reporting losses.

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[11] We use bottom-line earnings to proxy for comprehensive income (which is the measure of income under the clean surplus relation that Ohlson [1995] assumes). Other comprehensive income items that are excluded from bottom-line earnings include: (1) unrealized losses/gains on long-term marketable equity securities (under SFAS No. 12 issued in December 1975); (2) foreign currency translation adjustments (under SFAS No. 52 issued December 1981); and (3) minimum pension liabilities (under SFAS No. 87 issued December 1985). Most of these items were reported for less than half of our sample period.

For example, Barth et al. (1996) investigate the relative pricing multiples for book value of equity and current earnings, and their relative explanatory power, in the context of firms facing bankruptcy and liquidation. Barth et al. (1996) develop their empirical model from an alternative perspective, rather than from the Ohlson (1995) framework, in order to avoid several restrictive assumptions in the Ohlson model.[13] However, they note that their coefficient predictions are consistent with those implied by the Ohlson (1995) framework.

Finally, the inclusion of book value of equity in equation (1) can be motivated on econometric grounds. Barth and Kallapur (1996) argue that scale differences affect both dependent and independent variables in cross-sectional valuation models regardless of whether the variables are undeflated or are expressed in per-share form. Failure to control for scale effects will bias the coefficient on earnings away from its true value. Barth and Kallapur (1996) suggest that the best way to control for cross-sectional scale differences is to include a scale proxy as an additional *independent variable*. Book value of equity is one variable they suggest for this econometric purpose. If larger firms tend to have both larger share prices and larger negative earnings in the event of a loss (which is, in fact, true, as we show below), then omitting a scale control from a price-earnings model will induce a negative bias in the coefficient on earnings.[14]

Thus, previous literature has posited three distinctly different roles for book value of equity in a cross-sectional valuation framework. Book value is hypothesized to be: (1) informative of expected future normal earnings; (2) an approximation of abandonment value; and (3) a control for scale differences. The analyses we report in section IV are aimed at distinguishing among these possible roles. However, we first establish that book value of equity is a correlated omitted variable in the simple earnings capitalization model.

Empirical Test of Book Value of Equity as a Correlated Omitted Variable

Empirical Model

We test whether the negative coefficient on earnings for loss firms results from omitting book value of equity by estimating the following equation (which is simply a rewrite of equation (2) using the notation introduced earlier in the paper):

$$P_t = \alpha + \beta X_t + \gamma BV_{t-1} + \varepsilon_t \tag{3}$$

where P_t is cum-dividend stock price at time t, X_t is current period bottom-line earnings per share, and BV_{t-1} is the book value of equity per share at the end of fiscal year $t - 1$.

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[12] A "Heard on the Street" column in the *Wall Street Journal* titled "Apple's Search for a Suitor May Go Unrequited As a Loss is Likely for Second Period in a Row" (Pulliam 1996, C2) illustrates this point. The article quotes a financial analyst who stated that absent the prospect of a takeover, Apple's share price easily could fall to its book value: "PC companies that lose money sell at book value."

[13] The restrictive assumptions include clean surplus, a particular stochastic process for abnormal earnings, a linear information model, and risk-neutrality. Barth et al.'s (1996) empirical model is total market value of equity regressed on end-of-period book value and income before extraordinary items and discontinued operations.

[14] Under this hypothesis, excluding book value is not the cause of the negative price-earnings relation. Rather, the hypothesis is that failing to control for scale differences causes the anomaly. Hence, if scale effects cause the anomaly, then including book value of equity, or any other proxy for scale differences, in the price-earnings relation will eliminate the anomaly.

If our correlated omitted variable hypothesis is true, then incorporating book value of equity in equation (3) should eliminate the negative coefficient on earnings. In addition, the coefficient on book value should be reliably positive for one or more of the reasons outlined above.

Correlation Structure and Empirical Results

The correlation structure among BV_{t-1}, P_t and X_t for loss firms fits exactly the pattern we expect for a correlated omitted variable (see table 3). Based on per-share data (see panel A), beginning-of-year book value is strongly positively correlated with stock price (Pearson correlation = .58) and strongly negatively correlated with current losses (Pearson correlation = −.49). Omission of BV_{t-1}, therefore, will introduce a negative bias in the coefficient on earnings for loss firms in equation (1).[15] Also notice in panel A that the correlation structure among BV_{t-1}, P_t and X_t for *profit* firms is different from that for loss firms. In particular, beginning-of-year book value is strongly *positively* correlated with earnings for profit firms (Pearson correlation = .66).[16] We use this result below when demonstrating a positive bias in the earnings coefficient of profit firms (in contrast to a negative bias in the earnings coefficient of loss firms) due to omitting book value of equity in equation (1).[17] Finally, panel B presents correlations based on undeflated values of the regression variables. While the correlations are somewhat larger, the patterns are identical to those based on per-share data in panel A. Hence, larger firms have higher share prices and larger losses (and profits) than smaller firms irrespective of whether the variables are measured in undeflated terms or on a per-share basis.

We use equation (3) to test whether omitting book value of equity contributes to the negative coefficient on earnings for loss firms. Equation (3) is estimated using the same data set we use to estimate equation (1) in table 2. To avoid redundancy, we report the results for equation (3) in table 4 along with those for equation (5), which we discuss below.

Adjusted R^2s (not shown) for the annual regressions rise substantially from a level that is below 16 percent (mean = 9 and median = 10 percent) when book value of equity is excluded from the model for loss firms (see table 2) to between 25 and 54 (mean = 42 and median = 43) percent when book value is included. This suggests book value of equity has substantial incremental explanatory power beyond earnings in equity valuation for loss firms. Moreover, the coefficient on book value, shown in the column headed "Loss (γ)" in table 4, is positive and highly significant (two-tailed test) overall (mean = 0.47, t = 11.84) and in each year, as expected. Most importantly, the coefficient on earnings in the column headed "Loss (β)" is significantly positive overall (mean = 0.16, t = 1.84) and in six of 18 years; it is never significantly negative.

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[15] Pairwise correlations of transitory components of earnings and the regression variables are also reported in table 3. TRX is negatively correlated with stock price and positively correlated with bottom-line earnings. TRX thus has the opposite correlation structure than that of book value, and thus it does not fit the necessary correlation profile for a correlated omitted variable in the simple earnings capitalization model. Note that TRX's positive correlation with X is due in part to TRX being included in X. TRX is negatively correlated (−.14 or less) with core earnings.

[16] The negative (positive) correlation between book value and earnings for loss (profit) firms holds for both bottom-line earnings and core earnings.

[17] When a relevant variable is positively correlated with the dependent variable and negatively (positively) correlated with the included variable, omitting the relevant variable will induce a negative (positive) bias in the coefficient on the included variable. See Greene (1993, 246) for details.

TABLE 3
Correlation Results

Panel A: Between^{c}Selected Variables (per-share basis) for Loss Firms and Profit Firms, Respectively

	Loss Firms (obs. = 15,843)				*Profit Firms (obs. = 53,734)*			
	P_t	X_t	BV_{t-1}	TRX_t	P_t	X_t	BV_{t-1}	TRX_t
P_t	1.00	−.30 .0001*	.58 .0001	−.30 .0001	1.00	.69 .0001	.66 .0001	.01 .1530
X_t	−.43 .0001	1.00	−.49 .0001	.51 .0001	.76 .0001	1.00	.67 .0001	.28 .0001
BV_{t-1}	.65 .0001	−.65 .0001	1.00	−.33 .0001	.72 .0001	.74 .0001	1.00	.03 .0001
TRX_t	−.16 .0001	.32 .0001	−.23 .0001	1.00	−.05 .0001	.07 .0001	−.02 .0001	1.00

Panel B: Between Selected Variables (total-dollar basis) for Loss Firms and Profit Firms, Respectively

	Loss Firms (obs. = 15,843)				*Profit Firms (obs. = 53,734)*			
	MV_t	TX_t	TBV_{t-1}	$TTRX_t$	MV_t	TX_t	TBV_{t-1}	$TTRX_t$
MV_t	1.00	−.67 .0001*	.84 .0001	−.68 .0001	1.00	.88 .0001	.83 .0001	−.13 .0001
TX_t	−.61 .0001	1.00	−.80 .0001	.78 .0001	.92 .0001	1.00	.87 .0001	.01 .0141
TBV_{t-1}	.72 .0001	−.71 .0001	1.00	−.58 .0001	.92 .0001	.90 .0001	1.00	−.19 .0001
$TTRX_t$	−.21 .0001	.35 .0001	−.28 .0001	1.00	−.04 .0001	.02 .0001	−.03 .0001	1.00

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* Indicates significance level (two-tailed).

Numbers *above* the diagonal represent Pearson correlations, and numbers *below* the diagonal represent Spearman rank correlations.

Variable definitions: P_t = stock price three months after fiscal year t (Compustat quarterly data item #14) plus dividends per share in year t (annual data item #26) adjusted for stock splits and dividends appropriate for the third month in fiscal year t + 1; X_t = bottom-line earnings (income available to stockholders, annual data item #172, minus preferred dividends, annual data item #19) divided by total number of shares outstanding (annual data item #25); BV_{t-1} = book value of equity at the end of the year t − 1 (annual data item #60) divided by total number of shares outstanding adjusted for stock splits and dividends; TRX_t = transitory earnings per share = X_t − CX_t, where CX_t (core earnings per share) = income before extraordinary items and discontinued operations available for common stockholders (annual data item #237) minus special items (annual data item #17) adjusted for income taxes, using a 40 percent tax rate, divided by total number of shares outstanding adjusted for stock splits and dividends; MV_t = total market value of equity three months after fiscal year t plus total dividends paid in year t; TX_t = total bottom-line earnings in year t; TBV_{t-1} = total book value of equity at the end of year t − 1; $TTRX_t$ = total transitory earnings in year t.

TABLE 4
Coefficient Estimates on Earnings and Book Value of Equity for Loss Firms vs. Profit Firms

$$P_t = \alpha + \beta X_t + \gamma BV_{t-1} + \varepsilon_t \tag{3}$$

$$P_t = \alpha + \beta X_t + \gamma BV_{t-1} + aD_t + bD_t{*}X_t + cD_t{*}BV_{t-1} + \varepsilon_t \tag{5}$$

	Coefficient on Earnings			*Coefficient on Book Value of Equity*		
Year	*Loss (β)*	*Profit ($\beta + b$)*	*Diff. (b)*	*Loss (γ)*	*Profit ($\gamma + c$)*	*Diff. (c)*
75	−.02	4.60	4.62	.29	.31	.02
	(−.07)	(18.21)**	(12.69)**	(2.26)*	(11.99)**	(.16)
76	−.09	5.41	5.50	.15	.23	.08
	(−.68)	(18.72)**	(17.33)**	(1.86)*	(6.47)**	(.93)
77	.11	4.45	4.34	.36	.30	−.06
	(.28)	(14.80)**	(9.03)**	(4.81)**	(9.31)**	(−.73)
78	.35	4.18	3.83	.34	.28	−.06
	(4.31)**	(16.05)**	(14.05)**	(11.47)**	(9.33)**	(−1.45)
79	1.10	3.42	2.32	.47	.21	−.26
	(3.04)**	(14.99)**	(5.43)**	(6.37)**	(6.93)**	(−3.18)**
80	−.01	5.78	5.79	.38	.13	−.25
	(−.03)	(13.00)**	(11.49)**	(9.61)**	(2.95)**	(−4.01)**
81	.18	3.71	3.53	.38	.28	−.10
	(1.36)	(12.78)**	(11.07)**	(14.69)**	(9.07)**	(−2.41)*
82	−.81	4.30	5.11	.24	.38	.14
	(−1.60)	(17.62)**	(9.11)**	(1.89)*	(13.83)**	(1.06)
83	.24	4.53	4.29	.54	.48	−.06
	(1.25)	(18.46)**	(13.79)**	(7.63)**	(17.73)**	(−.76)
84	.22	3.97	3.75	.54	.56	.02
	(1.76)*	(11.97)**	(10.61)**	(15.80)**	(15.01)**	(.29)
85	.38	4.41	4.03	.70	.64	−.06
	(2.51)**	(6.98)**	(6.20)**	(16.37)**	(6.38)**	(−.59)
86	.38	5.41	5.03	.76	.72	−.04
	(2.35)*	(8.79)**	(7.90)**	(16.55)**	(11.70)**	(−.55)
87	.16	4.62	4.46	.69	.67	−.02
	(.93)	(10.75)**	(9.65)**	(18.47)**	(13.17)**	(−.26)
88	−.12	3.68	3.80	.54	.77	.23
	(−.68)	(8.39)**	(8.07)**	(10.57)**	(10.52)**	(2.60)**
89	.20	5.45	5.25	.49	.51	.02
	(1.56)	(8.43)**	(7.98)**	(12.26)**	(3.07)**	(.20)
90	.25	6.32	6.07	.41	.49	.08
	(2.05)*	(8.99)**	(8.52)**	(12.35)**	(6.74)**	(1.01)
91	.23	6.53	6.30	.56	.50	−.06
	(1.46)	(11.50)**	(10.67)**	(13.05)**	(7.04)**	(−.73)
92	.06	7.12	7.06	.68	.70	.02
	(.31)	(12.09)**	(11.36)**	(13.78)**	(11.22)**	(.29)
Mean	.16	4.88	4.72	.47	.45	−.02
	(1.84)*	(19.71)**	(17.35)**	(11.84)**	(9.79)**	(−.71)

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* (**) Significant at the .10 (.01) level based on White's heteroscedasticity-corrected standard errors for annual regressions (two-tailed) or a simple t-test for the mean effect over 18 years (two-tailed).

Variable definitions: P_t = stock price three months after fiscal year t (Compustat quarterly data item #14) plus dividends per share in year t (annual data item #26) adjusted for stock splits and dividends appropriate for the third month in fiscal year t + 1; X_t = bottom-line earnings (income available to stockholders, annual data item #172, minus preferred dividends, annual data item #19) divided by total number of shares outstanding (annual data item #25); BV_{t-1} = book value of equity at the end of year t − 1 (annual data item #60) divided by total number of shares outstanding adjusted for stock splits and dividends; $D_t = 1$ if $X_t \geq 0$; $D_t = 0$ otherwise.

Specification of the Price-Earnings Relation

The results in the previous section suggest that the anomalous negative price-earnings relation using the simple earnings capitalization model for loss firms is due to the omission of book value of equity from the model. Because the valuation and econometric arguments presented above for including book value of equity in the price-earnings relation for loss firms are largely applicable to profit firms as well, we conjecture that the simple earnings capitalization model is also misspecified for profit firms. That is, if book value of equity is a valuation relevant variable, it should play that role irrespective of whether a firm reports a profit or a loss, although Burgstahler and Dichev (1997) show that the value relevance of book value declines as book return on equity increases. More clearly, if book value is a control for scale differences, such a control should be required across the entire set of earnings realizations. Hence, book value of equity should be included in the specification of the price-earnings relation for profit firms as well as loss firms. We expect the coefficient on earnings to be positively biased for profit firms in the simple earnings capitalization model due to the omission of book value of equity, opposite to what is observed for loss firms.

We estimate equation (3), the earnings capitalization model augmented by book value of equity, using profit firms. The mean adjusted R^2 (not shown) over the 18 years is 61 percent (median = 64 percent). This compares to a mean (median) of 54 (54.5) percent when equation (1) is estimated (see table 2). Hence, there is only a small increase in explanatory power when book value is added to the earnings capitalization model for profit firms. This is in contrast to the sharp increase in mean (median) R^2 from 9 to 42 (10 to 43) percent when book value is added to the model for loss firms.

Table 4 reports the coefficient estimates from equation (3) for profit firms. The column headed "Profit (γ + c)" details the coefficients on book value of equity, which are reliably positive in all years (overall mean = 0.45, t = 9.79). The coefficients on earnings, reported in the column headed "Profit (β + b)," remain significantly positive in each year (mean = 4.88, t = 19.71). However, the earnings coefficients (and significance levels) for profit firms are *smaller* in each year compared to the coefficients on earnings for profit firms when book value of equity is omitted in equation (1). (Compare the "Profit (β + b)" column in table 4 with the "β" column for profit firms in table 2.) This suggests that omitting book value of equity in the simple earnings capitalization model *positively* biases the coefficient on earnings for *profit* firms, just opposite to the *negative* bias in the coefficient on earnings for *loss* firms.[18]

This differential bias in the coefficient on earnings between profit and loss firms is due to the differential correlation structure between book value of equity and earnings for profit firms vs. loss firms. Recall, table 3 shows that the correlation between book value of equity and earnings is positive for profit firms but is negative for loss firms, while the correlation between book value and stock price is positive for both profit and loss firms. The omission of book value of equity in the simple earnings capitalization model, therefore, creates a positive bias in the coefficient on earnings for profit firms but a negative bias for loss firms. This bias in the coefficient on earnings is not readily apparent for profit firms since the bias is in the same direction as the expected sign of the coefficient on earnings (i.e., both positive). However, the bias is more apparent for loss firms since it is in the opposite direction of the expected sign of the coefficient on earnings. The negative bias is sufficiently severe that it causes the estimated coefficient on earnings to be negative for loss firms, thus, revealing the bias.

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[18] We find that the mean intercepts are significant and positive (2.48 and 3.81, respectively) when estimating equation (3) for loss firms and profit firms. This is consistent with other value-relevant information (v_t in the Ohlson model) with positive pricing effects being excluded from the empirical model. Pricing effects would be positive, for example, for unrecorded assets having earnings effects that are not yet fully recognized in current earnings.

Hence, our analysis supports the conclusion that the simple earnings capitalization model is misspecified. The estimated coefficient from using such a model would be biased in opposite directions depending on the proportion of profit vs. loss firms in the sample. A more properly specified model for examining the price-earnings relation is equation (3), which includes both earnings and book value of equity as independent variables.

Using equation (3), we compare the market's valuation of losses with its valuation of profits. Refer again to the regression results for equation (3) estimated on loss firms and profit firms reported in table 4. We find that the coefficient on earnings when including book value of equity in the model is reliably smaller for loss firms than for profit firms overall (means of 0.16 vs. 4.88) and in every year.[19] This suggests that, unlike positive earnings, the market views losses as more transitory and thus places less weight on losses for valuation purposes (consistent with Hayn [1995]).

In figure 2 we plot separately for profit firms and loss firms the estimated price-earnings relation. Solid lines reflect the inclusion of book value of equity in the model specification and dotted lines the exclusion of book value. The plots reveal the positive (negative) bias in the earnings coefficient for profit (loss) firms when book value of equity is omitted in the simple earnings capitalization model. Further, figure 2 highlights the difference between the market's valuation of negative vs. positive earnings even after controlling for book value of equity. We therefore caution researchers against pooling loss firms with profit firms in a cross-sectional levels model. Not only is the simple earnings capitalization model misspecified, but the importance of earnings differs for profit firms as compared to loss firms even when using the more properly specified model of the price-earnings relation that includes both earnings and book value of equity.[20]

IV. THE ROLE OF BOOK VALUE OF EQUITY IN THE PRICE-EARNINGS RELATION

As we have seen, table 4 reports that the coefficient on book value of equity in equation (3) is reliably positive for loss firms and profit firms alike, and we can motivate the inclusion of the book value of equity in the model based on econometric or valuation arguments. In this section we report the results of analyses aimed at distinguishing among these possible roles that book value of equity plays in equation (3).

Book Value of Equity as a Control for Scale Differences

Alternative Proxies for Scale

An implication of Barth and Kallapur's (1996) research is that book value of equity plays a role as a control for scale differences in equation (3). A necessary but not sufficient condition for this econometric (scale) explanation of why book value of equity is important in equation (3) is that our sample reflects cross-sectional differences in scale. To determine whether scale differences are present in the sample, we consider several alternative candidates for scale. For instance, total assets is an appealing candidate since it reflects an entity's

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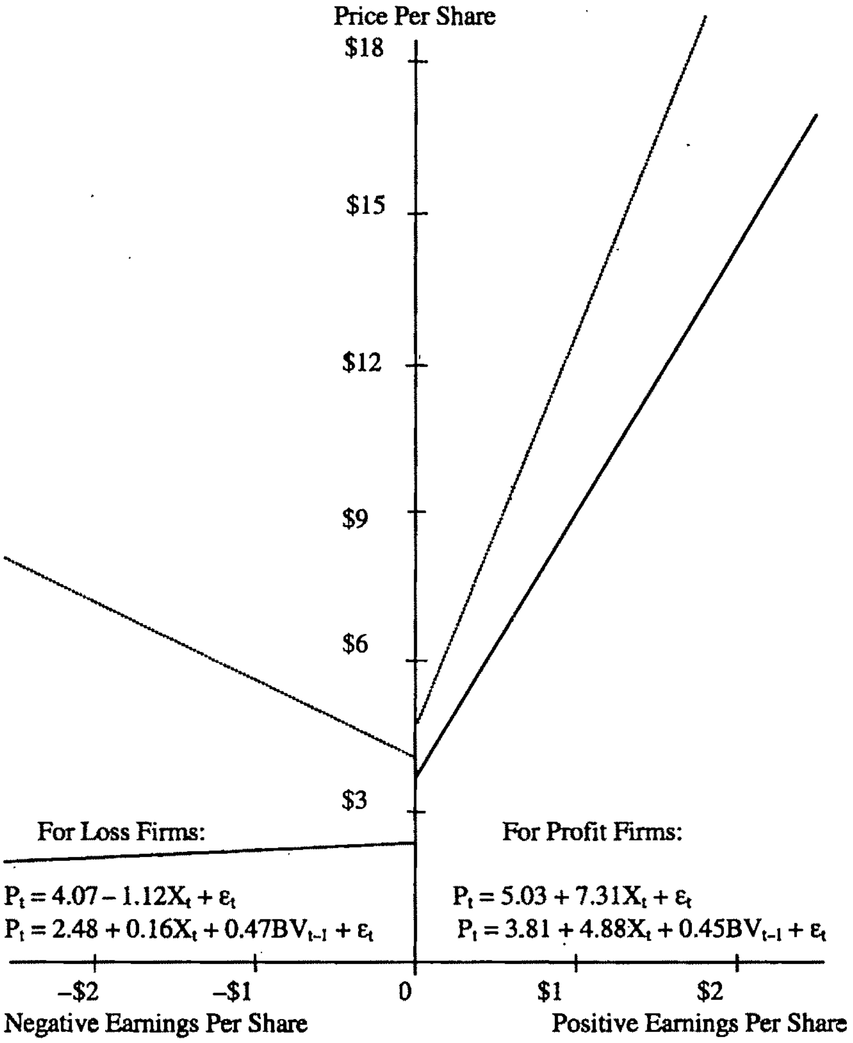
[19] The results are qualitatively identical when core earnings are used in the model instead of bottom-line earnings.

[20] In simulations not reported here, we find that the coefficient on earnings in equation (3) increases monotonically as one moves from 100 percent loss firms in the simulated estimating sample through decreasing percentages of loss firms to 100 percent profit firms.

FIGURE 2

Plots of Price-Earnings Relations for Profit Firms and Loss Firms After Controlling for Book Value of Equity (solid lines) and Without Controlling for Book Value of Equity (dotted lines)



Book value of equity is suppressed in the solid line graphs. Variable definitions: P_t = stock price three months after fiscal year t (Compustat quarterly data item 14) plus dividends per share in year t (annual data item 26) adjusted for stock splits and dividends appropriate for the third month in fiscal year t + 1; X_t = bottom-line earnings (income available to stockholders, annual data item 172, minus preferred dividends, annual data item 19) divided by total number of shares outstanding (annual data item 25); BV_{t-1} = book value of equity at the end of year t − 1 (annual data item 60) divided by total number of shares outstanding adjusted for stock splits and dividends.

total resources, irrespective of how they are financed. Similarly, total revenue measures a firm's overall level of operating activity. We compute correlations between earnings and these alternative proxies for scale (details not shown). Specifically, we relate earnings to beginning-of-year total assets, end-of-year total assets, and total revenues. For our sample of loss firms, all Pearson (and Spearman) correlations are significantly negative, averaging approximately −0.35 (−0.61). Thus, our sample reflects cross-sectional differences in scale. Moreover, the scale effects are present in both the undeflated and per share data. Recall from table 3 that book value has a correlation structure with the price and earnings variables that meets the necessary conditions for it to be a correlated omitted variable, and the correlation structure is present whether the variables are undeflated or expressed as per share amounts.

If book value of equity primarily serves the role of a scale proxy, then other (arguably superior) scale proxies should be (at least) as successful at removing the negative coefficient on current earnings for loss firms as book value of equity. In addition, there is no reason to believe, *a priori*, that these other scale proxies might also be value attributes. Accordingly, we replace BV_{t-1} in equation (3) with each of the following variables: beginning-of-period total assets per share, end-of-period total assets per share, and total revenues per share. Although the magnitude and significance of the negative coefficient on earnings are reduced in each year, the coefficient on earnings is still significantly negative overall and in at least 13 of 18 years, depending on which alternative scale proxy is used (results not shown).

Similarly, if book value primarily serves an econometric role of controlling for scale differences, rather than as a value-relevant variable, then augmenting equation (3) with an alternative candidate to control for scale differences should detract from the explanatory power of book value of equity. On the other hand, if book value of equity is primarily a value attribute, it should have significant explanatory power beyond that of the scale proxy. We observe (in results not reported here) virtually no change in the significance of the coefficient on book value of equity when we re-estimate equation (3) for our sample of loss firms after adding beginning- or end-of-year total assets per share or total revenues per share to the model.

The Relative Importance of Earnings and Book Value for Profit vs. Loss Firms

Next, if book value of equity is a control for scale differences, then another implication is that it should serve this role equally for profit firms and loss firms alike. On the other hand, if book value is a relevant valuation attribute, it should play a relatively more prominent role in valuation of loss firms than for profit firms, while earnings should receive less weight (Ohlson 1995; Burgstahler and Dichev 1997; Jan and Ou 1995). This is because current losses typically are not a useful source of information about expected future earnings; hence, investors can be expected to rely more on book value for that purpose. Moreover, since losses cannot be sustained indefinitely, the likelihood of abandonment is undoubtedly higher for loss firms than for firms reporting profitable operations and book value can proxy for abandonment value.

We investigate the implications for the relative importance (i.e., weighting) of book value of equity in valuation if book value is a control for scale differences or a value-relevant factor by estimating the following regression for the combined sample of profit and loss firms:

$$P_t = \alpha + \beta X_t + \gamma BV_{t-1} + aD_t + bD_t{*}X_t + cD_t{*}BV_{t-1} + \varepsilon_t \qquad (5)$$

where $D_t = 1$ if $X_t \geq 0$ (i.e., a profit firm-year); otherwise $D_t = 0$. The α, β and γ coefficients are for loss firms as in equation (3), and the a, b and c coefficients capture the *incremental* effects for profit firms. We predict that $b > 0$ and $c < 0$; i.e., that current earnings is more important in valuation of profit firms vis-à-vis loss firms and book value is less important.

Table 4 summarizes the results. Specifically, the estimated incremental coefficient values for profit firms across 18 years are as follows: in the column headed "Diff. (b)," mean b = 4.72 (t = 17.35); and in the column "Diff. (c)," mean c = −0.02 (t = −0.71). Thus, profit firms have a significantly larger mean coefficient on earnings as compared to loss firms, but the mean coefficient on book value of equity does not differ between profit and loss firms. The results based on annual regressions (and two-tailed tests) generally confirm the mean results. Profit firms have reliably larger earnings coefficients in all 18 years. They also have reliably smaller (larger) book value of equity coefficients in three years (one year). Hence, current earnings receives less weight in valuation for loss firms compared to profit firms, but book value generally appears to be equally important for both groups.

In diagnostic tests (not tabled), we re-estimate equations (3) and (5) after replacing bottom-line earnings (X_t) with its two components, core earnings (CX_t) and the transitory components of current earnings (TRX_t). The coefficient on BV_{t-1} is 0.39 (t = 9.78) for profit firms and 0.46 (t = 12.17) for loss firms, with loss firms having a significantly larger coefficient (difference = −0.07, t = −2.54). Hence, these results suggest that the weight placed on book value in valuation is dependent on the earnings variable in the model. The weight is greater for loss firms than for profit firms, as expected if book value serves primarily as a value-relevant attribute, when earnings enters the model decomposed into its core and transitory components. However, there is no difference in the weights on book value when aggregate bottom-line earnings are used. These differing results are apparently due to the sharply different degrees of persistence in CX_t and TRX_t;[21] i.e., aggregating CX and TRX into X results in a loss of information.[22]

The results in this section are mixed in their support for book value primarily serving the role as a control for scale differences or primarily serving the role as a value-relevant attribute. This is in contrast to the evidence reported in the preceding section, which is inconsistent with the significance of book value in the expanded price-earnings relation being derived from its role as a control for scale. We conclude that the overall evidence does not support the hypothesis that book value *primarily* serves the role as a control for scale differences in cross-sectional models. In the next section, we directly examine book value's explanatory power as a value-relevant factor.

Book Value of Equity as a Value-Relevant Factor

The literature suggests that book value of equity proxies for expected future normal earnings (Ohlson 1995) or for abandonment (i.e., liquidation) value (Berger et al. 1996; Barth et al. 1996; Burgstahler and Dichev 1997). We attempt to provide evidence on this issue by developing proxies for expected future normal earnings and abandonment value, and replacing book value of equity in equation (3) with both proxies. As a first step, we expect to find that the negative price-earnings relation is not present when the expected future normal earnings and abandonment value variables are included in the model in place of book value of equity, just as it is not present when book value is used to augment the simple price-earnings model. Next, we identify situations where expected future normal earnings are likely to be more important than abandonment value. One such case is for firms that survive a number of years after reporting a loss. We then test to determine whether the inclusion of expected future normal earnings in the model dominates the inclusion of abandonment value. Similarly, we consider cases where abandonment value is expected to dominate (e.g., for nonsurviving firms).

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[21] The mean coefficient on CX_t is 5.69 (t = 16.93) for profit firms and 0.40 (t = 3.77) for loss firms, with a difference of 5.29 (t = 16.74). The mean coefficient on TRX_t is 1.32 (t = 5.92) for profit firms but −0.32 (t = −2.57) for loss firms, with a difference of 1.64 (t = 8.62). Thus, profit firms have reliably positive mean coefficients on core and transitory earnings, and both coefficients are reliably larger than their counterparts for loss firms. (In a variation of equation (1) in which P is regressed on CX and TRX, both CX and TRX have negative (positive) coefficients for loss (profit) firms.)

[22] We conjecture that the resulting measurement error due to aggregation is correlated with book value and affects the estimation of its coefficient.

Sample Selection

We examine several *subsets* of the sample of loss firms. Our research strategy is to compare samples of loss firms that differ regarding the probability of surviving. We first assume perfect foresight (i.e., we use *ex post* outcomes to classify firms) and compare firms that survive with firms that do not survive. Specifically, we require surviving firms to have ten years of data after the year they report a loss and nonsurviving firms to liquidate or go bankrupt in no more than two years following a loss. Firms that do not fall into these two categories are eliminated. We determine bankruptcy and liquidation using data from the Compustat Research file.[23] Our sample sizes for this analysis are reduced to 713 surviving firms (covering 1975–1983)[24] and 618 nonsurviving firms (covering 1975–1991). In our second comparison, we examine firms reporting a loss currently but no losses in the previous four years (called "single loss" firms) vs. loss firms that also report at least three losses in the previous four years ("multiple loss" firms). The sample period for this analysis spans 1979–1992 and yields 1,197 single loss firms and 1,649 multiple loss firms. In contrast to the first comparison, the second comparison classifies firms on an *ex ante* basis, i.e., based on information available at the time firms report their current loss.

Empirical Model

We use the following model to evaluate the alternative valuation roles of book value of equity:

$$P_t = a_0 + a_1X_t + a_2FUTX_t + a_3EXITV_t + \varepsilon_t \qquad (6)$$

where $FUTX_t$ is a firm's expected future normal earnings at time t, and $EXITV_t$ is its exit (i.e., abandonment) value. $FUTX_t$ equals $BV_{t-1} \times r_t$, where r_t is an estimate of a firm's expected cost of equity capital. We derive firm-specific r_t values as follows. We estimate a firm's stock beta by regressing its monthly stock return on the CRSP value-weighted market index over the 60 months prior to year t.[25] We then estimate r_t in year t using the CAPM with the estimated firm-specific beta and a risk premium that equals the historical average of 8.67 percent (e.g., Berger et al. 1996).[26] Risk-free rates are based on one-month treasury-bill rates.

To compute abandonment value we use the "exit" value equation in Berger et al. (1996). Based on a sample of firms having discontinued operations with asset write-offs, Berger et al. (1996) estimate a regression whose coefficients indicate how many cents per

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[23] Firms that are taken over are also included on the Compustat Research file. We exclude such firms from our analysis since we do not know if they were viable entities when taken over or if they were failing firms.

[24] In this analysis we need stock price three months after year-end only for the event year. Hence, we can include surviving firms having earnings data as late as 1993.

[25] The results are not sensitive to the use of an equally weighted market index. To minimize the impact of extreme values, we winsorize the estimated betas to be no less than 0 and no greater than 2.5.

[26] Hence, $r_t = R_{ft} + Beta_t$ (Risk Premium), and $R_{ft} \leq r_t \leq R_{ft} + 2.5$ (8.67 percent).

dollar of book value various categories of assets generate when business segments are discontinued.[27] They use the resulting parameter estimates in the following model to calculate a firm's exit value:

$$\begin{aligned} EXITV_t = {} & 1.0\ Cash_t + 1.0\ Marketable\ Securities_t + 0.72\ Receivables_t \\ & + 0.55\ Inventory_t + 0.54\ Fixed\ Assets_t - 1.0\ Payables_t - 1.0\ Total\ Debt_t. \end{aligned}$$

We use this model and these parameter estimates to estimate abandonment value for our sample and impose the restriction that $EXITV_t \geq 0$, as did Berger et al. (1996). A negative abandonment value has no economic meaning for limited liability companies.

Results of Empirical Tests: Surviving Vs. Nonsurviving Loss Firms

We first evaluate the two postulated value-relevant roles for book value of equity—expected future normal earnings and abandonment value—by comparing loss firms that survive vs. those that do not (as previously defined). Table 5 presents descriptive statistics for book value of equity and the independent variables in equation (6) for the samples of surviving and nonsurviving firms. For both groups, the Pearson correlations in panel A indicate that, as expected, book value is highly correlated with both FUTV and EXITV, and the latter two variables are highly correlated as well. Panel B of table 5 suggests that surviving firms, on average, have less negative and less variable current earnings than nonsurviving firms, and they also have higher average levels of expected future earnings, exit values and book values. The patterns suggested by these summary statistics are as expected.

Turning to the regression analysis, we estimate equation (6) for both the surviving and nonsurviving firms, and we estimate equation (3), which includes earnings and book value of equity as independent variables, for comparison purposes. Table 6 presents pooled regression results.[28]

For surviving firms, the results of estimating equation (3) are shown in the first row in panel A of table 6, which is labeled (3). The adjusted R^2 for the model is 45 percent, comparable to the mean R^2 of 42 percent for the overall sample of loss firms. The coefficient on earnings is insignificant (it is positive for the overall sample in table 4), and the coefficient on book value is reliably positive, as in table 4.

With respect to equation (6) for the surviving firms, the adjusted R^2 for the model is 43 percent and the coefficient on earnings does not differ from zero. Hence, as is the case when we include book value of equity in equation (3), there is no evidence of the anomalous negative price-earnings relation when we substitute FUTX and EXITV for book value in equation (6). Including both expected future normal earnings and abandonment value in the price-earnings model specification has essentially the same effect on the earnings coefficient and overall explanatory power of the model as including book value of equity.

The coefficient on FUTX in equation (6) is reliably positive ($a_2 = 2.22$, $t = 7.51$). This indicates that expected future normal earnings are value-relevant factors for firms that survive. However, the coefficient on EXITV, while positive, is insignificant ($a_3 = .06$, $t = 1.08$). This lack of significance for abandonment value for loss firms that, in fact, survive

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[27] Berger et al. (1996) obtain data from the National Automated Accounting Research Service (NAARS) over the period 1984–1993. Their sample is composed of 157 observations and contains both sales of discontinued operations to single buyers and "fire sale" liquidations of separate assets to multiple buyers.

[28] We pool firm-year observations in these analyses since we are working with relatively small samples, which may make annual regression estimates unreliable.

TABLE 5
Descriptive Statistics of Surviving Firms (n = 713) and Nonsurviving Firms (n = 618)

Panel A: Pearson Correlations Between Independent Variables and Book Value of Equity (n = 1,331)[a]

	X_t	$FUTX_t$	$EXITV_t$	BV_{t-1}
X_t		−.47 .0001*	−.37 .0001	−.49 .0001
$FUTX_t$	−.50 .0001		.74 .0001	.95 .0001
$EXITV_t$	−.29 .0001	.49 .0001		.82 .0001
BV_{t-1}	−.51 .0001	.91 .0001	.57 .0001	

Panel B: Summary Statistics for the Independent Variables and Book Value of Equity

		Mean	*Std. Dev.*	*5th Percentile*	*Median*	*95th Percentile*
X_t:	Surviving	−0.846	1.207	−3.449	−0.378	−0.002
	Nonsurviving	−1.097	1.519	−4.099	−0.578	−0.004
$FUTX_t$:	Surviving	1.417	1.646	0.064	0.921	4.720
	Nonsurviving	0.592	0.711	0.011	0.335	1.975
$EXITV_t$:	Surviving	3.922	6.161	0	1.961	14.077
	Nonsurviving	1.609	2.856	0	0.443	7.683
BV_{t-1}:	Surviving	7.498	8.636	0.370	4.795	26.108
	Nonsurviving	3.490	3.820	0.083	2.252	11.445

* Indicates significance level (two-tailed).

[a] Numbers *above* the diagonal represent correlations for surviving firms, and numbers *below* the diagonal represent correlations for nonsurviving firms.

Variable definitions: X_t = bottom-line earnings (Compustat income available to stockholders, annual data item #172, minus preferred dividends, annual data data item #19) divided by total number of shares outstanding (annual data item #25); BV_{t-1} = book value of equity at the end of year t − 1 (annual data item #60) divided by total number of shares outstanding adjusted for stock splits and dividends; $FUTX_t = r_t{*}BV_{t-1}$, where r_t is firm-specific, risk-adjusted expected return; $EXITV_t$ = Cash + Marketable Securities + .72*Receivables + .55*Inventory + .54*Fixed Assets − Payables − Total Debt. Surviving firms are composed of year t (t from 1975 to 1983) loss firms that have earnings data for at least ten years subsequent to year t. Nonsurviving firms are composed of year t (t from 1975 to 1991) loss firms that are bankrupt or liquidated within two years subsequent to year t.

is not too surprising given that these firms are not facing imminent liquidation. However, we note these results are inconsistent with results reported in Barth et al. (1996) whose primary sample is comprised of firms approaching bankruptcy.[29]

Panel A of table 6 also reports separate regression estimates when only FUTX is added to the simple earnings capitalization model, labeled equation (FX), and when only EXITV

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[29] Note that the coefficient values of FUTX and EXITV are not directly comparable due to the large difference in magnitude of these two independent variables.

TABLE 6
R²-Decompositions and Vuong Tests for Surviving vs. Nonsurviving Firms

$$P_t = \alpha + \beta X_t + \gamma BV_{t-1} + \varepsilon_t \tag{3}$$

$$P_t = a_0 + a_1 X_t + a_2 FUTX_t + a_3 EXITV_t + \varepsilon_t \tag{6}$$

$$P_t = b_0 + b_1 X_t + b_2 FUTX_t + \varepsilon_t \tag{FX}$$

$$P_t = c_0 + c_1 X_t + c_3 EXITV_t + \varepsilon_t \tag{EV}$$

Panel A: Surviving Firms

Equation	*Intercept*	X_t	BV_{t-1}	$FUTX_t$	$EXITV_t$	*Obs.*	*Adj.* R^2
(3)	2.86 (13.01)**	0.22 (1.18)	.47 (13.59)**			713	$R_3^2 = .45$
(6)	2.93 (12.41)**	0.10 (0.48)		2.22 (7.51)**	.06 (1.08)	713	$R_6^2 = .43$
(FX)	2.93 (12.37)**	0.09 (0.44)		2.39 (10.47)**		713	$R_{FX}^2 = .43$
(EV)	3.94 (11.61)**	−0.59 (−1.10)			.45 (4.97)**	713	$R_{EV}^2 = .28$

1. R² Decomposition

Incremental R² by $FUTX_t$: $R_6^2 - R_{EV}^2 = .43 - .28 = .15$

Incremental R² by $EXITV_t$: $R_6^2 - R_{FX}^2 = .43 - .43 = .00$

2. Vuong Test

Eq. (FX) vs. Eq. (EV): Vuong's z-statistic = 3.21 (two-tail p-value = .001)

Panel B: Nonsurviving Firms

Equation	*Intercept*	X_t	BV_{t-1}	$FUTX_t$	$EXITV_t$	*Obs.*	*Adj.* R^2
(3)	1.41 (12.21)**	.28 (3.31)**	.44 (11.89)**			618	$R_3^2 = .30$
(6)	1.47 (12.56)**	.11 (1.29)		1.51 (7.88)**	.27 (4.11)**	618	$R_6^2 = .31$
(FX)	1.59 (13.29)**	.15 (1.53)		2.08 (10.08)**		618	$R_{FX}^2 = .26$
(EV)	1.76 (14.96)**	−.19 (−3.25)**			.42 (6.61)**	618	$R_{EV}^2 = .22$

1. R² Decomposition

Incremental R² by $FUTX_t$: $R_6^2 - R_{EV}^2 = .31 - .22 = .09$

Incremental R² by $EXITV_t$: $R_6^2 - R_{FX}^2 = .31 - .26 = .05$

2. Vuong Test

Eq. (FX) vs. Eq. (EV): Vuong's z-statistic = .79 (two-tail p-value = .43) is included, labeled equation (EV). In addition, we present R^2 decompositions for each of these models relative to equation (6) and a Vuong (1989) test to assess the relative importance of expected future earnings vs. exit value in explaining firm values.[30] For surviving firms, the incremental contribution of FUTX to the overall R^2 of 43 percent for equation (6) is 15 percent vs. zero percent for EXITV. Including only FUTX in the model yields an R^2 of 43 percent, while including only EXITV yields an R^2 of 28 percent. The Vuong test confirms that expected future normal earnings is a more important factor vis-à-vis abandonment value ($z = 3.21$). However, including either FUTX or EXITV eliminates the significant negative price-earnings relation for these loss firms.

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* (**Significant at .10 (0.01) level using White's heteroscedasticity-corrected standard error (two-tailed).

Variable definitions: X_t = bottom-line earnings (Compustat income available to stockholders, annual data item #172, minus preferred dividends, annual data data item #19) divided by total number of shares outstanding (annual data item #25); BV_{t-1} = book value of equity at the end of year t − 1 (annual data item #60) divided by total number of shares outstanding adjusted for stock splits and dividends; $FUTX_t = r_t{*}BV_{t-1}$, where r_t is firm-specific, risk-adjusted expected return; $EXITV_t$ = Cash + Marketable Securities + .72*Receivables + .55*Inventory + .54*Fixed Assets − Payables − Total Debt. Surviving firms are composed of year t (t from 1975 to 1983) loss firms that have earnings data for at least ten years subsequent to year t. Nonsurviving firms are composed of year t (t from 1975 to 1991) loss firms that are bankrupt or liquidated within two years subsequent to year t.

The results for nonsurviving firms are presented in panel B of table 6. For both equation (3) and equation (6) the adjusted R^2 is approximately 30 percent, which is lower than the corresponding R^2s for surviving firms. However, unlike the case of surviving firms, the coefficients on both FUTX and EXITV are reliably positive for equation (6) ($a_2 = 1.51$, $t = 7.88$; $a_3 = .27$, $t = 4.11$). Thus, not only is abandonment value an important explanatory factor of stock price for firms known *ex post* to fail, but so too is expected future normal earnings. Given the low baseline rate of failure among publicly traded firms, it is perhaps not too surprising that market participants would find book value of equity to be informative of both expected future normal earnings and abandonment value even for firms that (we know *ex post*) ultimately fail.

With respect to the relative importance of expected future normal earnings and abandonment value for nonsurviving firms, the Vuong test fails to reject the null hypothesis that FUTX and EXITV are equally important ($z = 0.79$). This does not support our expectation that EXITV would dominate FUTX for nonsurviving firms. Moreover, including only EXITV in the model does not eliminate the anomalous negative coefficient on earnings.

To examine further the relative importance of FUTX and EXITV for surviving and nonsurviving loss firms, we estimate the following regression on the combined sample of surviving and nonsurviving firms:

$$\begin{aligned} P_t = {} & a_0 + a_1X_t + a_2FUTX_t + a_3EXITV_t \\ & + a_{0D}{*}D_t + a_{1D}D_t{*}X_t + a_{2D}D_t{*}FUTX_t + a_{3D}D_t{*}EXITV_t + \varepsilon_t \end{aligned} \tag{7}$$

where $D_t = 0$ (1) if a firm survives (does not survive). In equation (7), the a_{2D} and a_{3D} coefficients represent the *incremental* effects on share price for nonsurviving firms vis-à-vis surviving firms of, respectively, FUTX and EXITV. The results (not shown in detail) are as follows: a_{2D} is significantly negative ($a_{2D} = -0.71$, $t = -2.01$); and a_{3D} is significantly positive ($a_{3D} = 0.21$, $t = 2.44$). Thus, as we would expect, FUTX is less important and EXITV is more important for nonsurviving firms relative to surviving firms.

Results of Empirical Tests: Single Loss vs. Multiple Loss Firms

The previous comparison classified loss firms into surviving or nonsurviving categories based on hindsight. Our second comparison is based on a proxy for the market's *ex ante* expectation of survival vs. nonsurvival. The proxy we use is whether a loss firm suffers a single loss or multiple losses in the most recent five years, including the current loss year. We expect that firms reporting a current period loss in earnings but no losses in the previous four years are more likely to survive. On the other hand, firms reporting a current loss plus at least three losses in the previous four years are more likely to liquidate.

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[30] The Vuong (1989) test is a likelihood ratio test to determine which of the two competing models explains more of the variation in the dependent variable. Dechow (1994, 23–24, 37–40) contains a detailed discussion about the Vuong (1989) test.

Table 7 reports the results.[31] Panel A is for single loss firms and panel B is for multiple loss firms. The first row of both panels presents the results for equation (3) and the second row the results for equation (6), and for both sets of firms and both equations, the price-earnings anomaly is not present. Of particular interest is that the coefficients on both FUTX and EXITV are reliably positive for both single loss and multiple loss samples in equation (6). Note that even for single loss firms, which we assume are viewed by the market as more likely to survive than multiple loss firms, there is a nonzero probability of abandonment; firms may discontinue their operations. Consequently, EXITV receives weight on an *ex ante* basis in valuation, as does FUTX for firms expected to survive. Similarly, the valuation of multiple loss firms reflects a significant role for expected future normal earnings, given the low baseline rate of failure in public companies.

Panel A of table 7 reveals that for single loss firms, FUTX adds significantly more to overall explanatory power of the model than does EXITV, based on the R^2 decomposition results and the Vuong test ($z = 4.17$). However, as was the case for nonsurviving firms, panel B reports that EXITV does not dominate FUTX for multiple loss firms ($z = 0.80$). In untabulated results where we estimate equation (7) across both samples simultaneously, the coefficient on expected future normal earnings declines insignificantly when moving from single loss to multiple loss firms ($a_{2D} = -.45$, $t = -1.06$), and the coefficient on D*EXITV rises insignificantly ($a_{3D} = .09$, $t = 1.03$). These results do not support our expectation that the market places less weight on expected future normal earnings and more weight on abandonment value for multiple loss firms relative to single loss firms.[32]

To summarize, we find that replacing book value of equity with empirical proxies for its two possible value-relevant roles eliminates the significantly negative price-earnings relation in the simple earnings capitalization model. This provides further support for book value serving the role of a value-relevant attribute. In our two comparisons aimed at differentiating the roles of book value of equity as a proxy for expected future normal earnings and as a proxy for abandonment value, we obtain mixed support for our predictions. For firms more likely to survive as a going concern, the role of book value as a proxy for expected future earnings appears to dominate its role as a proxy for abandonment value. However, for those firms that are more likely to liquidate, the results suggest that book value plays both roles—as a proxy for expected future earnings and as a proxy for abandonment value—and neither appears to dominate the other.

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[31] Descriptive statistics for single loss and multiple loss firms are not shown, but they are similar to those in table 5 for surviving and nonsurviving firms, respectively. The correlations among variables remain significant, but they are somewhat lower in magnitude for single loss firms relative to surviving firms and equal or somewhat higher for multiple loss firms vis-à-vis nonsurviving firms. All patterns revealed in panel B of table 5 also repeat themselves except for current earnings. Single loss firms have a more negative mean and median X and a larger standard deviation as compared to multiple loss firms, whereas surviving firms have smaller magnitudes for these statistics of X than do nonsurviving firms. Despite the overall similarities, there is relatively little overlap between the samples. There are 117 observations in both the 713 surviving firms sample and the 1,197 single loss firms sample. Thus, 16 percent of surviving firms are also single loss firms and 10 percent of single loss firms are also surviving firms. (There are only 20 overlapping observations in the 713 surviving and 1,649 multiple loss samples.) Similarly, there are 76 overlapping observations in the 618 nonsurviving and 1,649 multiple loss samples. Thus, 12 percent of nonsurviving firms are also multiple loss firms and 5 percent of multiple loss firms are nonsurviving firms. (Only 35 observations are in both the 618 nonsurviving and 713 single loss samples.) Thus, the analyses in tables 6 and 7 are based on fairly independent samples.

[32] When core earnings are used instead of bottom-line earnings, results of estimating equation (7) reveal a significant decline in a_{2D} and a significant increase in a_{3D}. Thus, these results indicate that the market places reliably less (more) weight on expected future normal earnings (on abandonment value) for multiple loss firms than for single loss firms.

TABLE 7
R²-Decompositions and Vuong Tests for Single vs. Multiple Loss Firms

$$P_t = \alpha + \beta X_t + \gamma BV_{t-1} + \varepsilon_t \qquad (3)$$

$$P_t = a_0 + a_1X_t + a_2FUTX_t + a_3EXITV_t + \varepsilon_t \qquad (6)$$

$$P_t = b_0 + b_1X_t + b_2FUTX_t + \varepsilon_t \qquad (FX)$$

$$P_t = c_0 + c_1X_t + c_3EXITV_t + \varepsilon_t \qquad (EV)$$

Panel A: Single Loss Firms

Equation	*Intercept*	X_t	BV_{t-1}	$FUTX_t$	$EXITV_t$	*Obs.*	*Adj. R^2*
(3)	2.98	.12	.60			1,197	$R_3^2 = .51$
	(11.33)**	(0.90)	(22.24)**				
(6)	4.08	−0.23		2.32	.12	1,197	$R_6^2 = .40$
	(14.09)**	(−1.58)		(10.91)**	(2.34)*		
(FX)	4.19	.21		2.65		1,197	$R_{FX}^2 = .38$
	(13.81)**	(−1.38)		(14.34)**			
(EV)	6.08	−1.26			.26	1,197	$R_{EV}^2 = .23$
	(12.92)**	(−6.16)			(2.27)**		

1. R² Decomposition

Incremental R² by $FUTX_t$: $R_6^2 - R_{EV}^2 = .40 - .23 = .17$

Incremental R² by $EXITV_t$: $R_6^2 - R_{FX}^2 = .40 - .38 = .02$

2. Vuong Test

Eq. (FX) vs. Eq. (EV): Vuong's z-statistic = 4.17 (two-tail p-value = .0001)

Panel B: Multiple Loss Firms

Equation	*Intercept*	X_t	BV_{t-1}	$FUTX_t$	$EXITV_t$	*Obs.*	*Adj. R^2*
(3)	2.11	−.10	.41			1,649	$R_3^2 = .24$
	(21.29)**	(−0.92)	(13.25)**				
(6)	2.10	−.17		1.87	.21	1,649	$R_6^2 = .25$
	(19.61)**	(−1.52)		(4.94)**	(2.65)**		
(FX)	2.14	−.13		2.66		1,649	$R_{FX}^2 = .23$
	(20.34)**	(−1.15)		(10.80)**			
(EV)	2.25	−.57			.42	1,649	$R_{EV}^2 = .21$
	(18.02)**	(−6.12)**			(5.54)**		

1. R² Decomposition

Incremental R² by $FUTX_t$: $R_6^2 - R_{EV}^2 = .25 - .21 = .04$

Incremental R² by $EXITV_t$: $R_6^2 - R_{FX}^2 = .25 - .23 = .02$

2. Vuong Test

Eq. (FX) vs. Eq. (EV): Vuong's z-statistic = 0.80 (two-tail p-value = .40)

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* (**) Significant at .10 (0.01) level using White's heteroscedasticity-corrected standard error (two-tailed).

Variable definitions: X_t = bottom-line earnings (Compustat income available to stockholders, annual data item #172, minus preferred dividends, annual data data item #19) divided by total number of shares outstanding (annual data item #25); BV_{t-1} = book value of equity at the end of year t − 1 (annual data item #60) divided by total number of shares outstanding adjusted for stock splits and dividends; $FUTX_t = r_t{*}BV_{t-1}$, where r_t is firm-specific, risk-adjusted expected return; $EXITV_t$ = Cash + Marketable Securities + .72*Receivables + .55*Inventory + .54*Fixed Assets − Payables − Total Debt. Single loss firms are composed of year t (t from 1979 to 1992) loss firms that have no losses in the four years prior to year t. Multiple loss firms are composed of year t (t from 1979 to 1992) loss firms that have three or four losses in the four years prior to year t.

V. CONCLUSION

Summary of the Results and Their Implications

This paper demonstrates the misspecification of the simple earnings capitalization model, and examines the role of book value of equity in the price-earnings relation for loss firms. We hypothesize that the anomalous significant negative coefficient on earnings for firms reporting losses using the simple earnings capitalization model is due to omitting book value of equity in the price-earnings specification. The inclusion of book value of equity in the price-earnings model is based on three distinctly different arguments in the literature about the roles of book value. Barth and Kallapur (1996) suggest that book value of equity can serve an econometric role as a control for scale difference in cross-sectional valuation models. Penman (1992) and Ohlson (1995) argue that the book value of equity is a value-relevant factor that proxies for expected future normal earnings. Alternatively, Berger et al. (1996) and Barth et al. (1996) view book value as a proxy for firms' abandonment option. Omitting book value of equity from the simple earnings capitalization model for loss firms, irrespective of whether book value plays the role of a control for scale differences or a value-relevant factor, can induce a negative bias in the coefficient on earnings if book value is positively correlated to stock price but negatively correlated with losses.

We show that when book value of equity is included in the price-earnings relation, the coefficient on earnings for loss firms is significantly positive overall and either positive (often significantly so) or insignificantly different from zero in each year of our 18-year sample period. Thus, including book value of equity in the price-earnings specification eliminates the anomalous negative coefficient on earnings documented in Jan and Ou (1995) and replicated in this study. Our results provide strong evidence that the simple earnings capitalization model is misspecified due to omission of book value of equity. We demonstrate this omission induces a *negative* bias in the coefficient on earnings for loss firms and a *positive* bias in the coefficient on earnings for profit firms. Moreover, the price-earnings relation is not homogeneous across profit firms and loss firms even after using the more properly specified model that includes both earnings and book value of equity. In particular, the coefficient on earnings is significantly larger for profit firms than for loss firms, which is consistent with Hayn's (1995) results that the market regards losses as being transitory. Overall, our results are inconsistent with Kothari and Zimmerman's (1995) conclusion (given their assumptions) that the coefficient on earnings in the simple earnings capitalization model is unbiased. Our results suggest that the capitalization rate on earnings would be biased downward (upward) if loss (profit) firms dominate the sample and book value of equity is omitted from the specification.

With respect to the role of book value of equity in the price-earnings relation, we first consider whether book value of equity serves primarily as a control for scale differences (Barth and Kallapur 1996). We replace book value with other (arguably superior) scale proxies and find that none of these variables eliminates the negative coefficient on earnings for loss firms. In addition, when these scale proxies are added in the price-earnings specification along with book value of equity, none of them detracts from the significance and explanatory power of book value. We also test whether book value plays an equally important role for loss firms and profit firms alike, which it should do if it is simply a control for scale differences. The results are mixed in that they are dependent on the earnings variable used in the model. Book value receives the same weight in valuation of loss and profit firms when bottom-line earnings are used. However, book value is significantly more important for loss firms when earnings enters the regression decomposed into its core and transitory earnings components (which differ greatly in their degrees of persistence). Overall, the evidence is generally inconsistent with book value of equity merely being a control for scale differences. Given these results, we turn our attention to testing competing hypotheses about book value's role as a value-relevant attribute in its own right.

Previous research suggests the value-relevance of equity book value stems from its role as a proxy for expected future normal earnings or as a proxy for abandonment or liquidation value. We use subsets of loss firms to provide evidence on these two competing valuation roles. We first document that replacing book value with proxies for both of its hypothesized value-relevant roles eliminates the anomalous significant negative price-earnings relation (as book value does). Next, we hypothesize that for loss firms that survive or that suffer only single-year losses, the primary valuation role of book value is as a proxy for expected future normal earnings. Conversely, we posit that for those loss firms that go bankrupt or liquidate or that suffer multiple losses, the primary valuation role of book value is as a proxy for liquidation or abandonment value. Our results support the first of these predictions and provide evidence, albeit somewhat weaker, consistent with the second set of predictions. Collectively, our results suggest that book value of equity is an important value attribute for loss firms, and that it plays a role as a proxy for expected future normal earnings and, *ex ante*, as a proxy for abandonment value. In addition, the relative importance of these roles depends on whether a firm is more likely to survive.

Our research extends the work of Berger et al. (1996), Barth et al. (1996) and Hayn (1995). Berger et al. (1996) and Barth et al. (1996) investigate the role of book value of equity as a proxy for abandonment or liquidation value only. We examine the role of book value as a proxy for expected future normal earnings, as implied by Ohlson's (1995) model, and as a proxy for abandonment or liquidation value. We allow these two roles of book value to have differential importance depending on the likelihood of surviving. Hayn (1995) uses a return-earnings specification, which does not incorporate book value of equity. Accordingly, she does not explicitly examine the role of book value in equity valuation although she motivates her study using the notion of abandonment option. We use a price-earnings specification that explicitly incorporates book value of equity and consider alternative roles that book value can play in equity valuation.

Limitations and Suggested Future Research

Burgstahler and Dichev (1997) use book value of equity to proxy for what they term "adaptation" value, which in concept represents a broader source of value than that derived from exercising the abandonment option. In their valuation model, a firm's stock price impounds both the stream of expected earnings and the value of a firm's resources in their next best alternative use. They refer to the former source of value as "recursion" value, and term the latter source of value "adaptation" value. Recursion value is derived from applying a firm's existing business technology to its resources. Adaptation value reflects the fact that a firm always has the option to dispose of (some or all of) its assets in external markets (e.g., asset sales, spin-offs, liquidation) or to redeploy them within the organization in more profitable ways (e.g., restructurings). Abandonment (or liquidation), therefore, is an extreme case of adaptation in the Burgstahler and Dichev (1997) framework.

Burgstahler and Dichev (1997) use book value to proxy for adaptation value because alternative proxies, for example, net realizable value (for external adaptation) and replacement cost (for internal adaptation), are not readily available.[35] Our measure of abandonment value, EXITV, reflects external adaptation value since it is based on disposals of discontinued operations as reported by Berger et al. (1996). If firms act optimally, they will discontinue operations only if the net benefits exceed those derived from alternative uses of their

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[33] They use core earnings to proxy for recursion value.

resources, including internal redeployments. Hence, if external adaptation represents the highest valued potential alternative use of firms' resources, then EXITV would reflect adaptation value as conceived by Burgstahler and Dichev (1997). On the other hand, if internal redeployment of existing resources were the next best use of resources for firms—that is, if internal adaptation value exceeds external adaptation value—Burgstahler and Dichev's (1997) adaptation value would not be captured by EXITV.

Future research might extend our analysis to incorporate proxies for internal adaptation value for cases where it is likely to exceed external adaptation value. One possibility is to identify surviving firms that restructure their operations in years following the reporting of a loss. Such restructurings would seem to suggest that firms find it optimal primarily to redeploy resources internally, rather than to enter external markets to engage in such activities as spinning-off or discontinuing operations, or at the extreme, liquidating. In such cases, an indicator of the incremental value of the internal adaptation over external adaptation might be developed to more directly test the validity of Burgstahler and Dichev's (1997) notion of adaptation value, and thus provide further evidence on the importance in valuation of the role of book value as a proxy for adaptation value.

APPENDIX

Justification for Empirical Specification

This appendix demonstrates that Ohlson's (1995) book value-abnormal earnings model can be re-expressed as a function of current earnings and lagged book value. For ease of comparison we use Ohlson's (1995) notation, and show in bold equation numbers that correspond to those in Ohlson's (1995) paper.

Preliminaries

The clean surplus relation (rearranged to put end-of-period book value on the left-hand side) is:

$$y_t = y_{t-1} + x_t - d_t \tag{A2a}$$

where y_t = book value of equity at time t, x_t = earnings for period t, and d_t = dividends in period t. The definition of abnormal earnings is:

$$x_t^a = x_t - (R_f - 1)y_{t-1}$$

where R_f is one plus the risk-free rate. The stochastic process assumption for abnormal earnings (where v_t is other nonaccounting value-relevant information) is:

$$x_{t+1}^a = \omega\, x_t^a + v_t + \varepsilon_{1t+1}. \tag{A3}$$

Ohlson's (1995) initial book value-abnormal earnings valuation model is:

$$P_t = y_t + \sum_{\tau=1}^{\infty} R_f^{-\tau} E(x_{t+\tau}^a) \tag{1}$$

where P_t is the firm's stock price at time t. Ohlson (1995, 669) shows that with the standard assumptions underlying the dividend discount model together with equations (A2a) and (A3), his equation (1) can rewritten as:

$$P_t = y_t + \alpha_1 x_t^a + \alpha_2 v_t. \tag{5}$$

Extension

By substituting the definition of abnormal earnings (x^a_t) from above into his equation (5), Ohlson (1995, 670) shows that price can be expressed as a function of current period earnings, book value at time t, lagged book value at t − 1 (i.e., y_{t-1}), and other information. That is:[34]

$$P_t = y_t + \alpha_1 x_t - \alpha_1(R_f - 1)y_{t-1} + \alpha_2 v_t. \tag{5a}$$

Substituting the right-hand side of the clean surplus relation in equation (A2a) into equation (5a) yields the following:

$$P_t = y_{t-1} + x_t - d_t + \alpha_1 x_t - \alpha_1(R_f - 1)y_{t-1} + \alpha_2 v_t. \tag{5b}$$

Collecting terms yields a pricing equation expressed in terms of cum-dividend price, current earnings, lagged book value, and other information:

$$(P_t + d_t) = (1 + \alpha_1)x_t + [1 - \alpha_1(R_f - 1)]y_{t-1} + \alpha_2 v_t. \tag{5c}$$

We delete the unspecified "other information" variable in our empirical tests and replace it with an intercept term and an error term in the following empirical analog to equation (5c):

$$(P_t + d_t) = \delta_0 + \delta_1 x_t + \delta_2 y_{t-1} + \varepsilon_t. \tag{5d}$$

(This is equation (2) in the text.) The intercept allows for nonzero mean pricing effects of the omitted other information, which becomes part of the error term. Note that the other information term, v_t, in Ohlson's framework "should be thought of as summarizing value relevant events that have yet to have an impact on the financial statements" (Ohlson 1995, 668). Thus, v_t is assumed to be independent of x_t and y_{t-1}. If this assumption is correct, then omitting this term in our empirical specification in equation (5d) will not affect the estimated coefficients on earnings or lagged book value.

With a change in notation (P_t, X_t and BV_{t-1} for variables ($P_t + d_t$), x_t and y_{t-1}, respectively, and α, β and γ for coefficients δ_0, δ_1 and δ_2, respectively), equation (5d) becomes equation (3) in the text.

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[34] Ohlson (1995, 670) notes that in this form, the valuation function shows "how earnings and book values operate as the primary value indicators."

REFERENCES

Barth, M., W. Beaver, and W. Landsman. 1996. Valuation characteristics of equity book value and net income: Tests of the abandonment hypothesis. Working paper, Stanford University.

———, and S. Kallapur. 1996. The effects of cross-sectional scale differences on regression results in empirical accounting research. *Contemporary Accounting Review* 13: 527–567.

Berger, P., E. Ofek, and I. Swary. 1996. Investor valuation of the abandonment option. *Journal of Financial Economics* 42: 257–287.

Bowen, R. M. 1981. Valuation of earnings components in the electric utility industry. *The Accounting Review* 56: 1–20.

Burgstahler, D., and I. Dichev. 1997. Earnings, adaptation and equity value. *The Accounting Review* 72: 187–215.

Daley, L. 1984. The valuation of reported pension measures for firms sponsoring defined benefit plan. *The Accounting Review* 59: 177–198.

Dechow, P. 1994. Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals. *Journal of Accounting and Economics* 18: 3–42.

Easton, P. D., and T. S. Harris. 1991. Earnings as an explanatory variable for returns. *Journal of Accounting Research* 29: 19–36.

Greene, W. H. 1993. *Econometric Analysis*. 2nd edition. New York, NY: Macmillan.

Hayn, C. 1995. The information content of losses. *Journal of Accounting and Economics* 20: 125–153.

Jan, C. L., and J. Ou. 1995. The role of negative earnings in the valuation of equity stocks. Working paper, New York University and Santa Clara University.

Kothari, S. P. 1992. Price-earnings regressions in the presence of prices leading earnings: Earnings level vs. change specifications and alternative deflators. *Journal of Accounting and Economics* 15: 173–202.

———, and J. L. Zimmerman. 1995. Price and return models. *Journal of Accounting and Economics* 20: 155–192.

Ohlson, J. A. 1995. Earnings, book values, and dividends in security valuation. *Contemporary Accounting Research* 11: 661–687.

Olsen, C. 1985. Valuation implications of SFAS No. 33 data for electric utility investors. *Journal of Accounting Research Supplement* 23: 28–47.

Penman, S. 1992. Return to fundamentals. *Journal of Accounting, Auditing and Finance* 7: 465–483.

Pulliam, S. 1996. Apple's search for a suitor may go unrequited as a loss is likely for second period in a row. *Wall Street Journal* 77 (January 19): C2.

Tse, S. 1989. Attributes of industry, industry segment and firm-specific information in security valuation. *Contemporary Accounting Research* 5: 592–614.

Vuong, Q. H. 1989. Likelihood ratio tests for model selection and non-nested hypotheses. *Econometrica* 57: 307–333.

White, H. 1980. A heteroscedasticity consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica* 48: 817–838.

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The Impact of Multiple Component Reporting on Tax Compliance and Audit Strategies

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ABSTRACT: Prior studies of the strategic interaction between taxpayers and the tax authority have focused on reported net taxable income and on audit policies designed to discover potential misstatement of that single item. This paper extends the literature by modeling taxpayer compliance behavior and tax authority audit strategies within the context of a multidimensional report of taxable income. Specifically, the study analyzes the impact of component reporting requirements on taxpayer incentives to misstate their tax liability. It also allows the tax authority to tailor its audit policy to consider all tax return information. In particular, the model permits the tax authority to audit return components sequentially: the investigation of a second component is conditional on the results of the first component's audit. The study finds that partitioning taxable income into a multi-component report reduces overall tax evasion and increases tax authority net revenue collections relative to a single-report model of net taxable income. However, the impact on predicted evasion is not uniform across taxpayers. While some taxpayers reduce evasion, others with multiple opportunities to evade are more likely to do so when faced with multi-component reporting requirements.

Key Words: *Tax compliance, Strategic auditing, Information economics, Game theory.*

I. INTRODUCTION

There is a significant body of research in accounting and economics examining tax compliance and auditing issues. However, *none* of the existing strategic models, and only a subset of empirical studies, consider the multidimensional nature of reported

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taxable income. Instead, most studies focus on the misreporting of a single item: net taxable income. These single-item studies relate the amount of potential tax evasion and the level of audit investigation to net taxable income. My study documents that taxpayer compliance, and therefore the evasion potential of any given tax return, depends on both the nature and magnitude of the individual components of that report. As evasion potential varies, so will tax authority audit behavior, audit costs and the amount of evasion detected upon audit. Therefore, simply relating evasion to net taxable income precludes the discovery of some meaningful insights into taxpayer evasion and its anticipation and detection by the tax authority. This study contributes to the growing tax-compliance literature by incorporating multiple component tax reports into a game-theoretic model of strategic auditing and tax compliance.

By expanding taxpayer reporting requirements beyond net taxable income, the study considers a number of reporting and auditing issues that can not be addressed in a single-report model. Specifically, the expanded model (1) recognizes that taxpayer evasion occurs through misstatement of specific components of taxable income rather than by simply reducing the bottom line, (2) permits the tax authority to make separate audit decisions for each component of the taxpayer's report, (3) allows the tax authority to audit report components sequentially, (4) lets audit costs vary across components, (5) allows audit costs to depend on audit sequence, and (6) considers potential relations between taxpayers' true income components and the impact of those relations on reporting and auditing strategies.

In the model, taxpayer reporting strategies identify the evasion potential inherent in each of two components of taxable income and anticipate the tax authority's optimal audit response to each component of the tax return. In comparison to a single-report model of net taxable income, taxpayers with the potential for evasion on multiple income components[1] are more likely to evade when faced with multi-component reporting requirements than when reporting only net taxable income. Conversely, taxpayers with fewer evasion opportunities are less likely to evade in a multi-component report than when reporting only net taxable income. Overall, less evasion occurs and revenue collections, net of expected audit costs, are greater in the multi-component model than in a comparable model where taxpayers report only net taxable income.

Given the secrecy surrounding the IRS' audit-choice process, little evidence exists as to whether tax return components are selected for audit simultaneously or sequentially, or even whether the audit process considers the strategic nature of taxpayer reporting choices.[2] This study suggests that a sequential approach allows the tax authority to allocate its audit resources where they are most effective in deterring and detecting tax evasion. On examining a report in which multiple components may be misstated, this study predicts that the tax authority will audit first the component with the lowest fixed audit costs.

Tax returns typically report information for a variety of income and expense items, consistent with the study's notion of a multi-component report. Casual empiricism suggests that true values for such items may not be independent. For example, a taxpayer with high salary income might be more likely to have high investment income in comparison to taxpayers with lower salaries. Knowledge of such relations could be useful to the tax authority in defining its expectations for reported values. This study finds that correlation of taxpayer true values impacts evasion behavior and its detection in predictable ways. If true values are positively correlated (such that a taxpayer with a high value for one component of income is more likely to have a high value for a second component), taxpayers tend to file reports consistent with these expectations. However, such reports are also more likely to be misstated and thus more evasion is likely to be detected by the tax authority in auditing these reports.[3] Interestingly, positive correlation of true values increases honest reporting by taxpayers with multiple evasion opportunities. Consequently, tax authority net revenue collections increase.

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[1] In the model, taxpayers have opportunity to evade only on those components for which they observe high true values. Thus, a taxpayer with a low level of any particular income component cannot reduce tax liability any further with respect to that component.

[2] Consistent with the audit strategies in this study, the Internal Revenue Service (IRS) has virtually abandoned comprehensive audits of taxpayer returns in favor of targeted identification of tax return items most prone to misstatement. In 1995, the IRS postponed indefinitely its plans to audit 150,000 tax returns under the Taxpayer Compliance Measurement Program, a program of comprehensive, detailed audits of randomly selected taxpayers (Herman 1995). Such audits were last conducted in 1988.

Finally, the study provides empirical predictions for detecting evasion in specific taxpayer report components. The amount of evasion detected varies across reports and depends on the evasion potential of report components and differential detection costs. The model's predictions capture strategic taxpayer behavior, such as avoiding low value reports for high profile items and reporting honestly those items that are inexpensive for the tax authority to verify.

The insights provided by this paper can assist the tax authority in improving its audit screening system and in targeting return components for which improved audit technologies can provide cost-effective detection and deterrence of tax evasion. The findings also are informative to policy makers considering changes in tax return reporting requirements. While finer partitions of taxable income allow focused auditing at lower costs, such increased reporting requirements may invoke surprisingly diverse responses from different types of taxpayers.

The next section of this paper reviews related literature and identifies features of existing tax compliance models relevant to this study. The model is presented in section III, and section IV provides results and discussion. Section V concludes with a summary and a discussion of the study's limitations.

II. RELATED LITERATURE

Several recent strategic models of tax compliance provide the foundation for this study (Graetz et al. 1986; Sansing 1993). These models derive the tax authority's audit strategy as a best response to the taxpayer's report of a single item, net taxable income.

Graetz et al. (1986) develop a model of taxpayer compliance and verification in which a taxpayer privately observes true taxable income that is either high or low, and chooses a report of taxable income, high or low. The tax authority decides whether to audit the observed taxpayer report. Auditing is costly, but perfectly reveals the taxpayer's true income. This simple binary model highlights the strategic nature of the interaction between taxpayers and the tax authority. While this model contributes to our understanding of taxpayer reporting behavior, it does not consider any information contained in the tax return beyond net taxable income.

Sansing (1993) develops a model of tax reporting in which the tax authority has imperfect information regarding the deductibility of one component of the taxpayer's reported taxable income. While his model considers the value of information regarding components of taxable income, he focuses on the audit strategy relative to a single component for which the taxpayer has private information, and fixes the level of all other components of the taxpayer's income.

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[3] Negative correlation of true values increases evasion and its detection in reports that reflect negatively correlated values of tax return components.

Klepper and Nagin (1989) develop a nonstrategic model of taxpayer line-item reporting choices to motivate their empirical analysis of tax evasion. Their model allows taxpayer perceptions of detection probability to vary by line item and to depend on the level of noncompliance of multiple line items. However, they specify detection functions exogenously rather than deriving them as strategic choices by the tax authority. The model developed in my paper extends the tax compliance and auditing literature by endogenously deriving the tax authority's audit strategy and taxpayer reporting strategies in the presence of multiple component tax reports.

As described in the next section of the paper, the current model considers a binary distribution of tax return components. A more general model would allow a continuum of true and reported taxable income values. However, in a multi-component continuous model, the equilibrium reporting and auditing strategies are defined by a pair of simultaneous partial differential equations. Such systems are generally not solvable analytically. Newman et al. (1996) present a two-location continuous model of auditing for fraud. They solve their model by assuming that if the auditor detects misstatement at one location then all overstatement at both locations is discovered. This "unraveling" assumption does not seem descriptive of a tax evasion audit setting, in which misstatement of one line item may or may not be linked to misstatement of another line item and, even where the tax authority believes that a component is misstated it must still incur costs to verify and document that misstatement.

If a multi-component continuous model were viable, it would extend the single-report continuous models developed by Reinganum and Wilde (1986) and Erard and Feinstein (1994). Reinganum and Wilde (1986) assume all taxpayers are strategic and model auditing as imperfect, with the tax authority choosing the probability of detection rather than the probability of audit. They identify a separating equilibrium in which all taxpayers underreport and the tax authority perfectly infers their true income from the report.

Erard and Feinstein (1994) modify the approach of Reinganum and Wilde (1986) to consider nonstrategic taxpayers. In this case, a separating equilibrium is not possible, since every possible report might be filed by either taxpayer type. Instead, the tax authority bases its detection strategy on probabilistic expectations regarding underlying true values. The solution to Erard and Feinstein's (1994) model is defined by a nonlinear second-order differential equation that cannot be solved analytically. They rely on numerical techniques to derive results.

The binary approach taken in this paper is applicable to tax return components where the important issue faced by a taxpayer is not the amount of income reportable (or deduction allowable) but whether a component of income is taxable (or an expenditure deductible). Thus, the model applies to questions such as whether a corporate reorganization is taxable or tax-free, whether a taxpayer qualifies for a home office deduction, and whether a loss on an asset disposition can be deducted currently or must be deferred.

III. MODEL DEVELOPMENT

General Assumptions

This section of the paper develops a strategic tax reporting and detection model in which taxpayers privately observe and report on two components of taxable income, denoted A and B. The notation used in this study is presented in table 1. The sum of the two components, $y = (A + B)$, represents the taxpayer's true taxable income. After privately observing these true values, each taxpayer must file a report of taxable income and its components, $\hat{y} = (\hat{A} + \hat{B})$, and pay a tax liability, $t\hat{y}$, where t represents the proportional

TABLE 1
Notation

$y = (A + B)$	Taxpayer's true level of taxable income
$\hat{y} = (\hat{A} + \hat{B})$	Taxpayer's reported level of taxable income
$A = A_i,\ i \in \{H, L\};\ B = B_j,\ j \in \{H, L\}$	Possible true values of tax return components A and B, respectively, where H and L denote high and low values
$\hat{A} = \hat{A}_i,\ i \in \{H, L\};\ \hat{B} = \hat{B}_j,\ j \in \{H, L\}$	Possible reported values of tax return components A and B, respectively, where H and L denote high and low values
$\alpha_{AB} \in \{\alpha_{LL}, \alpha_{HH}, \alpha_{LH}, \alpha_{HL}\}$	Probability vector for each possible combination of components A and B, where the first (second) subscript denotes the true value of component A (B)
$\alpha_A;\ \alpha_B$	Probability of observing a high true value for components A and B, respectively
ε	Measure of correlation of the probability distribution of true values of components A and B
t	Proportional tax rate
π	Proportional penalty rate
$A_\Delta = (A_H - A_L);\ B_\Delta = (B_H - B_L)$	Magnitude of the difference between possible true values of items A and B, respectively
c_{FA}	Fixed audit cost if item A is audited first
c_{FB}	Fixed audit cost if item B is audited first
$c_A;\ c_B$	Marginal cost of auditing components A and B, respectively
$\lambda^{\hat{i}\hat{j}}_{AB}$	Probability that a taxpayer observing components A and B reports component A at level $\hat{i}$ and component B at level $\hat{j}$
$\rho^{\hat{i}\hat{j}}_{A};\ \rho^{\hat{i}\hat{j}}_{B}$	Tax authority audit probabilities for components A and B, respectively, given reported component A at level $\hat{i}$ and reported component B at level $\hat{j}$
$\rho^{\hat{i}\hat{j}}_{A_1};\ \rho^{\hat{i}\hat{j}}_{B_1}$	Probability that the tax authority audits component A or B, respectively, first, given reported component A at level $\hat{i}$ and reported component B at level $\hat{j}$
$\rho^{\hat{i}\hat{j}}_{A_2\|B_j};\ \rho^{\hat{i}\hat{j}}_{B_2\|A_i}$	Probability that the tax authority audits component A or B second, given the revealed true value B_j or A_i for reported component A at level $\hat{i}$ and reported component B at level $\hat{j}$

(*Continued on next page*)

TABLE 1 (Continued)

$\beta^{\hat{i}\hat{j}}_{A_1}$; $\beta^{\hat{i}\hat{j}}_{B_1}$	Tax authority's initial belief that component A or component B is misstated, given reported component A at level $\hat{i}$ and reported component B at level $\hat{j}$
$\beta^{\hat{i}\hat{j}}_{A_2 \mid B_j}$; $\beta^{\hat{i}\hat{j}}_{B_2 \mid A_i}$	Tax authority's updated belief regarding the probability that item A or B is misstated, given the revealed true value B_j or A_i for reported component A at level $\hat{i}$ and reported component B at level $\hat{j}$
$P^{\hat{i}\hat{j}}_{A}$; $P^{\hat{i}\hat{j}}_{B}$	Probability that misstatement of component A or B occurs and is discovered, given reported component A at level $\hat{i}$ and reported component B at level $\hat{j}$
E(TA)	Expected tax authority net revenue
$pr(\hat{y}_{ij})$	Equilibrium probability of observing report $\hat{y}_{ij}$
$x^{\hat{i}\hat{j}}_{A}$; $x^{\hat{i}\hat{j}}_{B}$	*Ex ante* probability that misstatement of component A or B occurs and is discovered in a joint report of component A at level $\hat{i}$ and component B at level $\hat{j}$

tax rate. The tax authority observes $\hat{A}$ and $\hat{B}$ and, based on the likelihood that these reported components misstate true tax liability, makes a costly audit decision for each component of the taxpayer's report. If understatement is discovered, the taxpayer must pay an additional tax liability and a proportional penalty assessed at rate π on the unpaid tax liability due to the detected misstatement.[4] Given this sequence of events and the tax authority's reliance on the taxpayer report in choosing an audit strategy, the model's solution is a sequential Bayes-Nash equilibrium.

Each component of taxable income is assumed to take one of two possible values, high or low, indicated by subscripts H and L, respectively.[5] Let $\alpha_{ij} \in \{\alpha_{LL}, \alpha_{HH}, \alpha_{LH}, \alpha_{HL}\}$ represent the probability that taxpayers in an audit class have true taxable income equal to A + B, where $A = A_i$, $i \in \{H,L\}$ and $B = B_j$, $j \in \{H,L\}$.[6] The first and second subscript letters on α represent the values of income components A and B, respectively. Also define the magnitude of the differences between possible true values as $A_\Delta = (A_H - A_L)$ and $B_\Delta = (B_H - B_L)$, respectively. To clarify notation, assume A_Δ and $B_\Delta > 0$.[7]

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[4] As Sansing (1993, 876) notes, the assumption that penalties are proportional to the tax liability is consistent with most penalty provisions in the U.S. Internal Revenue Code (IRC). See IRC Sections 6651, 6662 and 6663. However, Beck and Jung (1989, 480) compare the effects of proportional penalties with those of fixed, nontransferable penalties. Nontransferable penalties represent costs incurred by taxpayers that are not paid to the tax authority. They find that the presence of fixed, nontransferable penalties generally reduces taxpayer reporting aggressiveness, equilibrium audit probabilities, and equilibrium audit benefit.

[5] High and low should be interpreted in terms of magnitude. Thus, for an income component, a high value represents more income than a low value; for a deduction component, a high value represents a larger expenditure than a low value. As discussed in footnote 7, the current analysis restricts attention to income components.

[6] The term "audit class" frequently is used in this literature to represent a subset of the taxpayer population identified on the basis of some readily observable characteristic, such as sex, race, occupation, or place of residence. All taxpayers within such a class are assumed to have true taxable income characteristics drawn from the same underlying distribution. This notion is an inherent assumption underlying theoretical models of tax compliance, since many of the results apply only to comparisons *within* audit classes, not *across* audit classes (Reinganum and Wilde 1986, 741). Taxpayer audit classes also are recognized in analyzing archival data and formulating compliance variable tests (Witte and Woodbury 1985; Dubin and Wilde 1988).

Further assume that taxpayers have true component A_H with probability α_A, true component A_L with probability $(1 - \alpha_A)$, true component B_H with probability α_B, and true component B_L with probability $(1 - \alpha_B)$. If occurrences of A and B are uncorrelated, then $\alpha_{HH} = \alpha_A\alpha_B$, $\alpha_{HL} = \alpha_A(1 - \alpha_B)$, $\alpha_{LH} = \alpha_B(1 - \alpha_A)$ and $\alpha_{LL} = (1 - \alpha_A)(1 - \alpha_B)$. To allow for correlation between occurrences of components A and B, let $\alpha_{HH} = \alpha_A\alpha_B(1 + \varepsilon)$, $\alpha_{HL} = \alpha_A[1 - \alpha_B(1 + \varepsilon)]$, $\alpha_{LH} = \alpha_B[1 - \alpha_A(1 + \varepsilon)]$ and $\alpha_{LL} = [1 - \alpha_A - \alpha_B + \alpha_A\alpha_B(1 + \varepsilon)]$, where $\text{Max}\{-(1 - \alpha_A)/\alpha_A, -(1 - \alpha_B)/\alpha_B\} < \varepsilon < \text{Min}\{(1 - \alpha_A)/\alpha_A, (1 - \alpha_B)/\alpha_B\}$.[8] Thus ε represents a measure of the correlation in the underlying joint distribution of components A and B. Note that $\varepsilon > 0$ implies a positive correlation between A and B, so that high true values of A are more likely to occur with high true values of B, while $\varepsilon < 0$ implies a negative correlation. This formulation allows the degree of correlation between levels of components A and B to vary with the size of ε, and with $\varepsilon = 0$, includes uncorrelated distributions of A and B as a special case.[9]

Since all combinations of A and B may occur with some probability in the audit class, the possible levels of true taxable income and reported taxable income are $y_{AB} \in \mathbf{y} = \{y_{LL}, y_{HH}, y_{LH}, y_{HL}\}$ and $\hat{y}_{AB} \in \hat{\mathbf{y}} = \{\hat{y}_{LL}, \hat{y}_{HH}, \hat{y}_{LH}, \hat{y}_{HL}\}$. Note that $y_{HH} > (y_{HL}$ and $y_{LH}) > y_{LL}$ [also $\hat{y}_{HH} > (\hat{y}_{HL}$ and $\hat{y}_{LH}) > \hat{y}_{LL}$]. The possible values of each component and their probabilities of occurrence are common knowledge.

Taxpayer Reporting Strategy and Payoffs

Taxpayers are assumed to be risk-neutral and choose a report of taxable income to maximize the expected value of income net of both taxes and any penalty assessed on detected underreporting of taxable income.[10] Let $\lambda_{AB}^{\hat{i}\hat{j}} \in [0,1]$ denote the probability that a taxpayer observing true components A and B (hereafter referred to as an AB-type taxpayer) reports component $\hat{A}_i$, $i \in \{H, L\}$ and component $\hat{B}_j$, $j \in \{H, L\}$. A strategy for an AB-type taxpayer is a reporting policy $\lambda_{AB} = (\lambda_{AB}^{\hat{L}\hat{L}}, \lambda_{AB}^{\hat{H}\hat{H}}, \lambda_{AB}^{\hat{L}\hat{H}}, \lambda_{AB}^{\hat{H}\hat{L}})$, which specifies the probability such a taxpayer will report every possible combination of $\hat{A}$ and $\hat{B}$. The taxpayer assesses the likelihoods that each component of any possible report will be audited by the tax authority, represented by $\rho_A^{\hat{i}\hat{j}}$ and $\rho_B^{\hat{i}\hat{j}}$, and chooses λ_{AB} to maximize total expected income after taxes and potential penalties:

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[7] In this case, A and B should be regarded as two income components rather than as an income item and a deduction. However, this assumption is made only to simplify notation. The model and its results could be extended to consider the case in which one component is an income item and the other is a deduction. In that case, the deduction component would have negative values.

[8] Using the definition of conditional probability, $\alpha_{HH} = \Pr(A_H|B_H)*\alpha_B = \Pr(B_H|A_H)*\alpha_A$. Given the first equality, positive correlation implies that $\Pr(A_H|B_H) > \alpha_A$. To allow for arbitrary correlation, let $\Pr(A_H|B_H) = \alpha_A(1 + \varepsilon)$, where $\varepsilon > 0$ represents positive correlation and $\varepsilon < 0$ represents negative correlation. The remaining equations then can be calculated by recognizing that the amount of any adjustment to α_{LL} due to correlation must equal the adjustment to α_{HH}.

[9] In an empirical study of tax evasion, Feinstein (1991, 27) finds a high positive correlation (0.80) between detected evasion of gross income and detected evasion of deductions. Such correlation represents a joint outcome of both taxpayer reporting choices and tax authority audit strategies. This paper allows for correlation of underlying true values and then examines whether such correlation affects the likelihood of observing reports reflecting correlated values.

[10] Graetz et al. (1986, 17–23) compare results under assumptions of risk-aversion vs. risk-neutrality in a single-report model. In their model, risk aversion modifies the optimal audit policy to consider the form of the taxpayer's utility function. Although risk aversion results in ambiguous predictions for some of their results on the impact of changes in model parameters on taxpayer and tax authority strategies, many of their results remain qualitatively unaffected by taxpayer risk preferences.

$$T[y_{AB}, \lambda_{AB}, \rho_A^{\hat{i}\hat{j}}, \rho_B^{\hat{i}\hat{j}}] = y_{AB} - t \sum_{\hat{i},\hat{j} \in \{H,L\}} \lambda_{AB}^{\hat{i}\hat{j}} \hat{y}_{\hat{i}\hat{j}}$$

$$- t(1 + \pi) \sum_{\hat{i},\hat{j} \in \{H,L\}} \lambda_{AB}^{\hat{i}\hat{j}} [\rho_A^{\hat{i}\hat{j}}(A - \hat{A}_i) + \rho_B^{\hat{i}\hat{j}}(B - \hat{B}_j)]. \quad (1)$$

The first term on the right hand side of equation (1) is the taxpayer's observed true income. The second term represents the expected tax liability paid on the initial report, considering each possible report of taxable income and the probability that each such report is filed. The equation's final term is the expected tax and penalty assessed on misstatement of reported tax liability, where $(A - \hat{A}_i)$ and $(B - \hat{B}_j)$ represent the possible misstatements of each income component, and $\rho_A^{\hat{i}\hat{j}}$ and $\rho_B^{\hat{i}\hat{j}}$ (as specified below) represent the probability that the tax authority audits components A and B, respectively, of a report $\hat{y}_{\hat{i}\hat{j}}$.[11]

Tax Authority Audit Strategy and Payoffs

The tax authority seeks to maximize collections of tax and penalty revenue, net of audit costs. Since tax and penalty rates are assumed to be exogenous, the tax authority can influence net revenue collections only through its audit strategy. The tax authority chooses the probability of auditing each component of any observed report of taxable income. If an audit occurs, any misstatement of the audited component is revealed.[12]

The tax authority chooses the order in which to examine each component of the observed two-component report, and bases its audit strategy for the second component on the results of its audit of the first component investigated. Thus, the tax authority's audit strategy for any reported component may depend on the reported value of that component, the reported value of the other taxable income component, the audit sequence, and the true value of the first audited component (for components audited second).

Let $\rho_{A_1}^{\hat{i}\hat{j}}$ represent the probability that component A is the first component that the tax authority audits in a report $\hat{y}_{\hat{i}\hat{j}}$, and $\rho_{B_1}^{\hat{i}\hat{j}}$ is the probability that component B is the first component audited. When A is audited first, $\rho_{B_2|A_i}^{\hat{i}\hat{j}}$ represents the probability that the tax authority audits component B second, given that its audit of A revealed a true value A_i, $i \in \{H, L\}$. When B is audited first, $\rho_{A_2|B_j}^{\hat{i}\hat{j}}$ represents the probability that A is audited second, given that the audit of B revealed a true value B_j, $j \in \{H, L\}$. From the taxpayer's perspective, the overall probability that component A (B) will be audited, $\rho_A^{\hat{i}\hat{j}}$ ($\rho_B^{\hat{i}\hat{j}}$), depends on the audit sequence and the taxpayer's true and reported values for component B (A). For a taxpayer with true value B_j filing a report $\hat{y}_{\hat{i}\hat{j}}$, $\rho_A^{\hat{i}\hat{j}} = \rho_{A_1}^{\hat{i}\hat{j}} + \rho_{B_1}^{\hat{i}\hat{j}} \rho_{A_2|B_j}^{\hat{i}\hat{j}}$. Similarly, for a taxpayer with true value A_i, $\rho_B^{\hat{i}\hat{j}} = \rho_{B_1}^{\hat{i}\hat{j}} + \rho_{A_1}^{\hat{i}\hat{j}} \rho_{B_2|A_i}^{\hat{i}\hat{j}}$.

If the tax authority chooses to audit either component of a report, it incurs a fixed audit cost. To emphasize the importance of the audit sequence choice, the fixed audit cost is allowed to vary depending on which component is audited first.[13] Thus, a fixed cost of c_{FA} (c_{FB}) is incurred if component A (B) is audited first. In addition, the tax authority incurs a marginal cost related to each audited component. Define c_A (c_B) as the marginal cost of auditing component A (B). Thus, if the tax authority audits only component A or component B of any report, it incurs a total cost of $c_{FA} + c_A$ or $c_{FB} + c_B$, respectively. If it audits both components of a report it incurs a total cost of $c_{FA} + c_A + c_B$ if it audits component A first, or a total cost of $c_{FB} + c_A + c_B$ if it audits component B first.

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[11] Because the taxpayer's beliefs regarding the likelihood that misstatement will be detected must be confirmed in equilibrium, additional notation distinguishing these beliefs from the actual detection probabilities is omitted to simplify the payoff statements and subsequent analysis.

[12] Imperfect detection would considerably expand the number of potential solutions to the model. without contributing significantly to insights regarding multi-component reporting and auditing.

[13] While this issue has not been previously addressed in a tax setting, studies of the financial-auditing process suggest that the order in which items are audited may influence the decision to collect additional audit evidence and incur additional costs (Asare 1992; Knechel and Messier 1990). Order could matter if the audit of one component produces knowledge spillovers that allow the auditor to be more efficient in auditing the next component.

For auditing to be a reasonable strategy, it must not be prohibitively costly. Consequently, assume that:

$$c_A < \text{Min}\left\{\frac{\alpha_{HL}t(1+\pi)A_\Delta}{(\alpha_{HL}+\alpha_{LL})}, \frac{\alpha_{HH}t(1+\pi)A_\Delta}{(\alpha_{HH}+\alpha_{LH})} - c_{FA}\right\}, \tag{2}$$

$$c_B < \text{Min}\left\{\frac{\alpha_{LH}t(1+\pi)B_\Delta}{(\alpha_{LH}+\alpha_{LL})}, \frac{\alpha_{HH}t(1+\pi)B_\Delta}{(\alpha_{HH}+\alpha_{HL})} - c_{FB}\right\}. \tag{3}$$

To interpret these constraints, note that auditing income component A produces additional net revenue only if the underlying true value is A_H. Inequality (2) provides that the expected marginal cost to audit component A must not exceed the expected benefit for a taxpayer for whom component B is not misstated, while the total cost (fixed and marginal) to audit component A must not exceed the expected benefit for a taxpayer for which component B may be misstated. Inequality (3) may be interpreted similarly. These constraints restrict attention to parameter combinations for which auditing is effective in deterring some level of tax evasion for all taxpayer types who have an incentive to evade. At higher cost levels, auditing is not effective in deterring evasion, and some taxpayer types strictly prefer to misstate at least one component of taxable income. Consistent with prior models of tax evasion, this paper restricts attention to cost levels for which auditing has at least some deterrence potential.[14]

The cost function allows the tax authority's cost of detecting misstatement of components A and B to differ due to differences in the verifiability of reported amounts and the taxpayer's ability to conceal unreported amounts. Given the potential for differences in component detection costs, this study investigates a general setting in which certain types of misstatement may be less costly to detect than others.[15]

The tax authority assesses the conditional probability that each component of any observed report is misstated. Let $\beta^{\hat{i}\hat{j}}_{A_1}$ and $\beta^{\hat{i}\hat{j}}_{B_1}$ represent the tax authority's initial beliefs as to the probability that components A and B are misstated, given the report $\hat{y}_{\hat{i}\hat{j}}$.[16] If the tax authority chooses to audit component A first, let $\beta^{\hat{i}\hat{j}}_{B_2|A_i}$ represent the tax authority's updated belief as to the probability that component B is misstated, given that its audit of A revealed true value A_i, $i \in \{H, L\}$. Similarly, $\beta^{\hat{i}\hat{j}}_{A_2|B_j}$ represents the updated belief that component A is misstated, given that its audit of B revealed true value B_j, $j \in \{H, L\}$. In equilibrium, these beliefs are derived using Bayes Rule, and must be consistent with the optimal taxpayer reporting strategies.

The tax authority observes $\hat{y}_{\hat{i}\hat{j}}$ and chooses its audit strategy to maximize:

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[14] Relaxing these constraints greatly expands the number of potential equilibria of the model, reducing the clarity of insights available from the analysis.

[15] For example, Henry (1988, 23) claims that misbehavior involving overstatements of expenses is easier to detect than underreporting of income, particularly for taxpayers with "low visibility" income such as tips or self-employment income. On the other hand, taxpayers whose income is derived primarily from exogenously verifiable sources (e.g., wages, interest and dividends), are more likely to overstate deductions (Nagin 1990, 15). For these taxpayers, any misstatement of income can be detected by computer matching, a relatively low-cost detection method, while investigation of deductions would require an audit of the taxpayer's report.

[16] The model allows for either reported value to be over or understated. However, the tax authority will only investigate potentially understated reported values of either component (Lemma 1).

$$\begin{aligned} \mathrm{TA}[\rho_A^{\hat{i}\hat{j}}, \rho_B^{\hat{i}\hat{j}}, \hat{y}_{ij}] = {} & t\hat{y}_{ij} + P_A^{\hat{i}\hat{j}} t(1 + \pi)A_\Delta + P_B^{\hat{i}\hat{j}} t(1 + \pi)B_\Delta - c_{FA}\rho_{A_1}^{\hat{i}\hat{j}} - c_{FB}\rho_{B_1}^{\hat{i}\hat{j}} \\ & - c_A\{\rho_{A_1}^{\hat{i}\hat{j}} + \rho_{B_1}^{\hat{i}\hat{j}}[\rho_{A_2|B_H}^{\hat{i}\hat{j}}\beta_{B_1}^{\hat{i}\hat{j}} + \rho_{A_2|B_L}^{\hat{i}\hat{j}}(1 - \beta_{B_1}^{\hat{i}\hat{j}})]\} \qquad (4) \\ & - c_B\{\rho_{B_1}^{\hat{i}\hat{j}} + \rho_{A_1}^{\hat{i}\hat{j}}[\rho_{B_2|A_H}^{\hat{i}\hat{j}}\beta_{A_1}^{\hat{i}\hat{j}} + \rho_{B_2|A_L}^{\hat{i}\hat{j}}(1 - \beta_{A_1}^{\hat{i}\hat{j}})]\} \end{aligned}$$

where:

$$P_A^{\hat{i}\hat{j}} = \rho_{A_1}^{\hat{i}\hat{j}}\,\beta_{A_1}^{\hat{i}\hat{j}} + \rho_{B_1}^{\hat{i}\hat{j}}[\beta_{B_1}^{\hat{i}\hat{j}}\rho_{A_2|B_H}^{\hat{i}\hat{j}}\beta_{A_2|B_H}^{\hat{i}\hat{j}} + (1 - \beta_{B_1}^{\hat{i}\hat{j}})\rho_{A_2|B_L}^{\hat{i}\hat{j}}\beta_{A_2|B_L}^{\hat{i}\hat{j}}] \qquad (5)$$

$$P_B^{\hat{i}\hat{j}} = \rho_{B_1}^{\hat{i}\hat{j}}\,\beta_{B_1}^{\hat{i}\hat{j}} + \rho_{A_1}^{\hat{i}\hat{j}}[\beta_{A_1}^{\hat{i}\hat{j}}\rho_{B_2|A_H}^{\hat{i}\hat{j}}\beta_{B_2|A_H}^{\hat{i}\hat{j}} + (1 - \beta_{A_1}^{\hat{i}\hat{j}})\rho_{B_2|A_L}^{\hat{i}\hat{j}}\beta_{B_2|A_L}^{\hat{i}\hat{j}}]. \qquad (6)$$

The first term on the right hand side of equation (4) is the tax collected from the initial report $\hat{y}_{ij}$. The second (third) term represents expected tax and penalties collected on detected misstatements of component A (B). $P_A^{\hat{i}\hat{j}}$ ($P_B^{\hat{i}\hat{j}}$) represents the probability that misstatement occurs and is detected given report $\hat{y}_{ij}$ and incorporates the tax authority's beliefs regarding the probability that A (B) is misstated and the audit strategy for component A (B). The fourth and fifth equation terms represent the expected fixed costs of auditing first components A and B, respectively, of the report. The sixth and seventh terms represent the expected marginal costs of auditing components A and B, respectively.

IV. RESULTS

This section of the paper begins with preliminary results that simplify the taxpayer and tax authority strategies by eliminating certain strategies never observed in equilibrium. Next, equilibrium strategies are presented and discussed. The paper then analyzes tax authority net revenue collections, develops hypotheses for empirical observations of tax evasion, and compares results of the multi-component model to an equivalent single-report model of net taxable income.

Preliminary Results

Lemma 1 describes taxpayer reporting strategies that do not occur in equilibrium and component reports that the tax authority strictly prefers not to audit.

Lemma 1: In equilibrium:

(a) the tax authority never audits reported values $\hat{A}_H$ or $\hat{B}_H$.
(b) LL-type taxpayers always report truthfully; and
(c) LH- and HL-type taxpayers never report $\hat{y}_{HH}$.

Proof: See appendix.

Intuitively, the tax authority cannot benefit from auditing a high reported value for any component, since this reported value represents the maximum tax collectible on this component for taxpayers in a given audit class. The tax authority will accept any high reported value and avoid a costly audit. Similarly, taxpayers observing low true values for both components cannot benefit from overreporting. Taxpayers observing one low and one high true value cannot benefit from overreporting the low value component while truthfully reporting the high value component.

Lemma 1 implies that the tax authority will not audit report $\hat{y}_{HH}$ and will at most audit a single component of reports $\hat{y}_{LH}$ and $\hat{y}_{HL}$. Only report $\hat{y}_{LL}$ contains potential misstatement of both components, thereby requiring an audit sequencing choice and joint audit strategy. Taxpayers observing true income y_{LH} and y_{HL} have evasion opportunities only for a single component, whereas taxpayers observing true income y_{HH} may underreport either or both components. To highlight the multi-component aspect of the model, the following discussion focuses primarily on the reporting behavior of HH-type taxpayers and auditing strategies for report $\hat{y}_{LL}$.

Equilibrium Strategies

Proposition 1:

(a) The following taxpayer reporting strategies are observed in equilibrium:
  (i) HH-type taxpayers randomize across all four possible reports,
  (ii) HL-type taxpayers randomize between reports $\hat{y}_{HL}$ and $\hat{y}_{LL}$, and
  (iii) LH-type taxpayers randomize between reports $\hat{y}_{LH}$ and $\hat{y}_{LL}$;

(b) When $c_{FA} < c_{FB}$, tax authority audit strategies are: $\rho_A^{\hat{L}\hat{H}} = \rho_B^{\hat{H}\hat{L}} = \rho_{A_1}^{\hat{L}\hat{L}} = 1/(1 + \pi)$, $\rho_{B_1}^{\hat{L}\hat{L}} = 0$, and $\rho_{B_2|A_L}^{\hat{L}\hat{L}} = \rho_{B_2|A_H}^{\hat{L}\hat{L}} = 1$;

(c) When $c_{FA} > c_{FB}$, tax authority audit strategies are: $\rho_A^{\hat{L}\hat{H}} = \rho_B^{\hat{H}\hat{L}} = \rho_{B_1}^{\hat{L}\hat{L}} = 1/(1 + \pi)$, $\rho_{A_1}^{\hat{L}\hat{L}} = 0$, and $\rho_{A_2|B_L}^{\hat{L}\hat{L}} = \rho_{A_2|B_H}^{\hat{L}\hat{L}} = 1$.

Proof: See appendix.

Comparing tax authority audit strategies in parts (b) and (c) of Proposition 1, note that the tax authority prefers to audit first (with probability $1/(1 + \pi)$) the component of report $\hat{y}_{LL}$ with the lowest fixed audit cost. Thus in part (b) of Proposition 1 (hereafter referred to as equilibrium I), the tax authority audits component A of report $\hat{y}_{LL}$ first because $c_{FA} < c_{FB}$. In part (c) of Proposition 1 (hereafter referred to as equilibrium II), the tax authority prefers to audit B first in report $\hat{y}_{LL}$ because $c_{FA} > c_{FB}$.

After auditing the component with the lowest fixed audit cost, the tax authority always audits the remaining component of report $\hat{y}_{LL}$, regardless of the results of its initial component audit.[17] This result occurs because the expected misstatement of the second component audited exceeds its marginal component audit cost.

Consistent with prior single-report studies (Graetz et. al 1986; Beck and Jung 1989; Morton 1993; Sansing 1993), the maximum total audit probability for any component of any report is $1/(1 + \pi)$. Taxpayers facing this audit probability randomize between truthful reporting and misstatement of high true value components and are indifferent between these alternatives. At lower audit probabilities, taxpayers would strictly prefer misstatement. Higher audit probabilities are not sustainable in equilibrium because they would induce all taxpayers to report truthfully, in which case the tax authority would then prefer to deviate from such an audit strategy. Because the difference between taxpayer payoffs for evading and reporting truthfully depends only on the penalty for misstatement if audited, the audit probability that will induce taxpayer indifference depends only on the penalty rate. Such indifference can only be achieved with fixed-rate auditing of all low value component reports.

Table 2 presents comparative static results for equilibria I and II, describing the impact of changes in specific model parameters on equilibrium taxpayer reporting strategies. In general, as the fixed and marginal costs of auditing a component increase, taxpayers are more likely to underreport that component. Thus, taxpayers recognize the investment required for auditing and evade in ways that are costly for the tax authority to detect.

The results of table 2 suggest that taxpayers with multiple evasion opportunities choose reported values to manage their audit exposure both for individual return components and in total. Such taxpayers prefer some type of evasion to a completely honest tax return, but may not pursue equally all evasion opportunities. In particular, note that taxpayers with

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[17] This result is sensitive to the cost constraints imposed by equations (2) and (3).

TABLE 2
Impact of Increases in Model Parameters on Equilibrium Taxpayer Reporting Strategies

Equilibrium	*Taxpayer Reporting Strategy*	*Marginal Audit Cost for Component A (c_A)*	*Marginal Audit Cost for Component B (c_B)*	*Fixed Audit Cost for Component A (c_{FA})*	*Fixed Audit Cost for Component B (c_{FB})*	*Correlation of Taxpayer True Values (ε)*
I	$\lambda_{LH}^{\hat{L}\hat{L}}$	0	+	0	0	+
	$\lambda_{HL}^{\hat{L}\hat{L}}$	+	0	+	0	+
	$\lambda_{HH}^{\hat{L}\hat{H}}$	+	−	+	0	−
	$\lambda_{HH}^{\hat{H}\hat{L}}$	−	+	−	+	−
	$\lambda_{HH}^{\hat{L}\hat{L}}$	+	+	+	0	±
	$\lambda_{HH}^{\hat{H}\hat{H}}$	±	−	±	−	+
	$\lambda_{HH}^{\hat{L}\hat{L}} + \lambda_{HH}^{\hat{H}\hat{L}}$	−	+	−	+	−
	$\lambda_{HH}^{\hat{L}\hat{L}} + \lambda_{HH}^{\hat{L}\hat{H}}$	+	0	+	0	−
II	$\lambda_{LH}^{\hat{L}\hat{L}}$	0	+	0	+	+
	$\lambda_{HL}^{\hat{L}\hat{L}}$	+	0	0	0	+
	$\lambda_{HH}^{\hat{L}\hat{H}}$	+	−	+	−	−
	$\lambda_{HH}^{\hat{H}\hat{L}}$	−	+	0	+	−
	$\lambda_{HH}^{\hat{L}\hat{L}}$	+	+	0	+	±
	$\lambda_{HH}^{\hat{H}\hat{H}}$	−	±	−	±	+
	$\lambda_{HH}^{\hat{L}\hat{L}} + \lambda_{HH}^{\hat{H}\hat{L}}$	0	+	0	+	−
	$\lambda_{HH}^{\hat{L}\hat{L}} + \lambda_{HH}^{\hat{L}\hat{H}}$	+	−	+	−	−

See table 1 for definitions of notation.
+ Indicates an increase in reporting probability when this parameter increases.
− Indicates a decrease in reporting probability when this parameter increases.
0 Indicates no change in reporting probability when this parameter increases.
Equilibrium I (II) is characterized by a cost structure in which item A (B) of report $\hat{y}_{LL}$ would be audited before item B (A).

multiple evasion opportunities respond differently to perceived changes in audit costs than taxpayers with fewer evasion opportunities. For HH-type taxpayers, with the potential to misstate both components, an increase in both fixed and marginal audit costs for component A in equilibrium I, increases the overall likelihood that these taxpayers will misstate component A ($\lambda_{HH}^{\hat{L}\hat{L}} + \lambda_{HH}^{\hat{L}\hat{H}}$) and decreases the overall likelihood they will misstate component B ($\lambda_{HH}^{\hat{L}\hat{L}} + \lambda_{HH}^{\hat{H}\hat{L}}$). Thus, an increase in the cost of auditing component A causes HH-type taxpayers to shift evasion from component B to component A. These taxpayers realign their evasion choices to reflect differences in detection costs.

An increase in the fixed and marginal audit costs for component B in equilibrium I increases the overall likelihood that HH-type taxpayers will misstate component B, but has no effect on overall misstatement of component A. To understand this result, recall that component A is audited first and component B second for report $\hat{y}_{LL}$ in equilibrium I.

Component B is audited second because it has higher fixed audit costs. An increase in the cost of auditing component B further increases the potential cost burden of auditing component B, and HH-type taxpayers respond by increasing their overall level of tax evasion. Similar results are observed in equilibrium II with respect to an increase in marginal audit costs for component A. Thus, HH-type taxpayers make different evasion choices for each return component depending on whether they expect that component to be audited first or second.

For taxpayers with incentive to misstate only one component of taxable income, the probability of such misstatement increases as the marginal audit cost of that potentially misstated component increases. Misstatement probability for these taxpayers is unaffected by the marginal audit cost of the component for which they report truthfully. Intuitively, these taxpayers respond only to those audit factors directly affecting their limited opportunities to evade.

An increase in the correlation of taxpayer true values has opposing effects on different taxpayer types. For HL- and LH-type taxpayers, an increase in ε increases the probability of tax evasion. However, for HH-type taxpayers, an increase in ε decreases the overall probability of tax evasion, for both components of taxable income. The probabilities that HH-types file reports reflecting negatively correlated values ($\hat{y}_{LH}$ and $\hat{y}_{HL}$) decline. The probability of filing the report $\hat{y}_{LL}$ (reflecting positively correlated values) may increase or decrease, but the overall probability of honest reporting by HH-types increases.

Overall, the above results suggest that multi-component reporting requirements have differential impacts on different taxpayer types. For some taxpayers, evasion for a particular component is sensitive only to factors directly affecting that component. For other taxpayers, a change in factors affecting one component may also indirectly influence evasion for another component. These effects depend on evasion potential of specific return components, taxpayer evasion opportunities, relations between underlying true values, the order in which components are audited, and relative audit costs.

Revenue Collections

As previously defined, the tax authority's objective is to maximize net revenue collections. Based on its audit strategy and taxpayer reporting choices, expected equilibrium net revenue collections are as follows:

$$E(TA) = \sum_{i,j \in \{H,L\}} TA[\rho_A^{\hat{i}\hat{j}}, \rho_B^{\hat{i}\hat{j}}, \hat{y}_{ij}] \, pr(\hat{y}_{ij}) \tag{7}$$

where TA[•] is defined by equation (4) and $pr(\hat{y}_{ij})$ is the equilibrium probability of observing report $\hat{y}_{ij}$.

Table 3 presents comparative static results about the equilibrium behavior of the revenue authority in both equilibria I and II as specific model parameters change. The first line in each panel of table 3 relies on equation (7) and displays how the expected net revenue achieved in equilibrium changes as model parameters change. Generally, an increase either in fixed (c_{FA} or c_{FB}) or marginal (c_A or c_B) audit costs decreases equilibrium net revenue. An increase in the probability that taxpayer true values are positively correlated increases net revenue, primarily because there is less evasion by HH-type taxpayers, as discussed above.

Observable Tax Evasion

While theoretical models examine both the incidence of tax evasion and strategies to deter and detect it, empirical investigations only observe data for which tax evasion both

TABLE 3
Impact of Increases in Model Parameters on Equilibrium Tax Authority Net Revenue Collections and Probabilities that Evasion Occurs and is Detected for Each Component of Each Potential Report

Equilibrium	*Equilibrium Value*	*Marginal Audit Cost for Item A* (c_A)	*Marginal Audit Cost for Item B* (c_B)	*Fixed Audit Cost for Item A* (c_{FA})	*Fixed Audit Cost for Item B* (c_{FB})	*Correlation of Taxpayer True Values* (ε)
I	E(TA)	–	–	–	–	+
	$x_B^{\hat{H}\hat{L}}$	–	+	–	+	–
	$x_A^{\hat{L}\hat{H}}$	+	–	+	0	–
	$x_B^{\hat{L}\hat{L}}$	+	+	+	0	+
	$x_A^{\hat{L}\hat{L}}$	+	+	+	0	+
II	E(TA)	–	–	–	–	+
	$x_B^{\hat{H}\hat{L}}$	–	+	0	+	–
	$x_A^{\hat{L}\hat{H}}$	+	–	+	–	–
	$x_B^{\hat{L}\hat{L}}$	+	+	0	+	+
	$x_A^{\hat{L}\hat{L}}$	+	+	0	+	+

See table 1 for definitions of notation.
+ Indicates an increase in equilibrium values when this parameter increases.
– Indicates a decrease in equilibrium values when this parameter increases.
0 Indicates no change in equilibrium values when this parameter increases.
Equilibrium I (II) is characterized by a cost structure in which item A (B) of report $\hat{y}_{LL}$ would be audited before item B (A).

occurs and is detected. This study's implications for empirical work are significant. Testable predictions can be derived by examining the probability that evasion occurs and is detected in each low value component of each potential report. Specifically, define $x_A^{\hat{i}\hat{j}}$ ($x_B^{\hat{i}\hat{j}}$) as the *ex ante* probability that misstatement of component A (B) occurs and is detected in a report $\hat{y}_{ij}$. Then:

$$x_A^{\hat{i}\hat{j}} = P_A^{\hat{i}\hat{j}}\,pr(\hat{y}_{ij}), \text{ and} \tag{8}$$

$$x_B^{\hat{i}\hat{j}} = P_B^{\hat{i}\hat{j}}\,pr(\hat{y}_{ij}) \tag{9}$$

where $P_A^{\hat{i}\hat{j}}$ and $P_B^{\hat{i}\hat{j}}$ are defined by equations (5) and (6), respectively.

Table 3 presents comparative static results for equations (8) and (9). Table 3 indicates that detected evasion of component A (B) generally increases when c_A (c_B) and c_{FA} (c_{FB}) increase. Since the probability of audit for either component does not depend on any cost parameter, the increase in detected evasion occurs because the probability of evasion increases. An increase in evasion increases the tax authority's overall audit burden, reduces the receipt of reports that are not audited, and overall net revenues decline, as seen in the first line of each panel of table 3. Thus, while increasing the probability of detected evasion may initially seem desirable from a policy perspective, these results indicate that the tax authority may not benefit from such a strategy.

For report $\hat{y}_{LH}$ ($\hat{y}_{HL}$), in which only component A (B) is potentially misstated, table 3 shows that the probability of detected evasion of component A (B) decreases when the marginal cost of auditing component B (A) increases. However, for report $\hat{y}_{LL}$, in which both components are potentially misstated, the probability of detected evasion of component A (B) increases when the marginal cost of auditing component B (A) increases. These results reflect shifts in the reporting strategy of HH-type taxpayers, whose reporting choices depend on parameter values for both tax return components, and who are more likely to evade in reporting both components when tax authority audit costs increase (as seen in table 2). These findings indicate that observations of tax evasion will vary with the evasion potential of observed reports as well as with the cost of auditing all components contained in a given report.

The results of table 3 suggest a number of empirically testable predictions. Such tests can be used to validate the strategic, multi-component modeling approach of this paper, as well as extending existing empirical work on tax evasion. For example, when specific tax return components are costly to audit, taxpayers reporting high values for those components are less likely to have evasion detected on their other (low reported value) components. This prediction is consistent with the notion that low reported values for high profile items (such as tip income or taking a home office deduction) may "red flag" a taxpayer's return. Conversely, return components that are extremely inexpensive to audit (such as dividend or interest income) are also less likely to be misstated. The ease with which such items can be verified deters taxpayers from misstatement.

Table 3 shows that an increase in the correlation of taxpayer true values decreases the probability of detected evasion in $\hat{y}_{HL}$ and $\hat{y}_{LH}$ reports while increasing the probability of detected evasion in $\hat{y}_{LL}$ reports. These results suggest that when taxpayer true values are positively correlated, more evasion will occur and be detected in reported values that are consistent with positive correlation than in reported values that are inconsistent. The reverse will be true for negatively correlated return components. These predictions are consistent with empirical evidence in Feinstein (1991, 27) showing a statistically significant positive correlation between detected evasion in taxpayer's adjusted gross income and itemized deductions.[18]

Comparison to Single-Report Setting

The preceding analysis explores taxpayer reporting behavior and detected evasion for each component of taxable income in the multi-component model. To compare these results to a single-report setting, consider a model in which taxpayers privately observe true values for both components A and B, $A = A_i, i \in \{H, L\}$ and $B = B_j, j \in \{H, L\}$, yet are required to report only net taxable income, $\hat{y} = (\hat{A} + \hat{B})$. As before, there are four possible combinations of true taxable income and four possible reports. Denote these reports as $\hat{y}_s$, $s \in \{1,2,3,4\}$. Each ij-taxpayer type files each possible report with probability λ_{ij}^s, and the tax authority audits each report with probability ρ^s. Further assume that the cost of auditing any report is c. Define x^s as the *ex ante* probability that misstatement occurs and is detected in a report $\hat{y}_s$. To facilitate comparisons to the multi-component results of Proposition 1, assume that $c_{FA} = c_{FB} = c_F$, and $c = c_A + c_B + c_F$. The comparisons of Proposition 2 also relate the four single reports to the multi-component reports of Proposition 1 as follows: $\hat{y}_1 = \hat{y}_{LL}$, $\hat{y}_2 = \hat{y}_{LH}$, $\hat{y}_3 = \hat{y}_{HL}$, and $\hat{y}_4 = \hat{y}_{HH}$.

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[18] Although the model considers only income components, recall that the levels of component true values are defined in terms of magnitude. Thus, a high level of income and high deductions would represent positively correlated outcomes in terms of the magnitude of component values.

Proposition 2: In comparison to the results of equilibrium I:[19]

(a) In a single-report model of net taxable income:
  (i) $\lambda^1_{LH} > \lambda^{\hat{L}\hat{L}}_{LH}$, $\lambda^1_{HL} > \lambda^{\hat{L}\hat{L}}_{HL}$, $\lambda^1_{HH} < \lambda^{\hat{L}\hat{L}}_{HH}$, and $\lambda^1_{HH} + \lambda^2_{HH} + \lambda^3_{HH} < \lambda^{\hat{L}\hat{L}}_{HH} + \lambda^{\hat{L}\hat{H}}_{HH} + \lambda^{\hat{H}\hat{L}}_{HH}$;
  (ii) $x^1 > x^{\hat{L}\hat{L}}_A + x^{\hat{L}\hat{L}}_B$, $x^2 = x^{\hat{L}\hat{H}}_A$, and $x^3 = x^{\hat{H}\hat{L}}_B$; and
(b) The tax authority's equilibrium net revenue collections from the multi-component model (E(TA) as defined in equation (7)) are greater than the net revenue collected from a single-report model of net taxable income.

Proof: See appendix.

Proposition 2 indicates that taxpayers with opportunity to misstate only one component of taxable income are generally more likely to evade in the single-report model than in the multi-component model. However, HH-type taxpayers, with opportunity to misstate both components, are more likely to evade in the multi-component model than in the single-report model. Detected evasion is lower for report $\hat{y}_{LL}$ in the multi-component model than the evasion detected in the equivalent report of the single-report model. The lower level of detected evasion occurs not because the audit is less effective, but because less evasion occurs in the multi-component model. The sequential audit strategy of the multi-component model successfully lowers the overall level of evasion relative to the single-report setting.

Proposition 2 also indicates that taxpayer revenue collections are greater in the multi-component model than in the single-report model. This result occurs for two reasons: (1) overall evasion is lower in the multi-component model, and (2) that model allows the tax authority to take advantage of joint audit cost efficiencies not available in the single-report setting.

V. CONCLUSIONS

The theoretical foundations for strategic analysis of tax reporting issues established by Graetz et al. (1986) have been extended in a variety of directions as researchers strive to gain new insights into the tax compliance and auditing game. This study represents an initial step in addressing pragmatic issues such as: (1) if taxpayers wish to evade, how do they do so; (2) which components of which reports are most likely to be misstated; and (3) for which components can the tax authority effectively detect evasion that occurs, and for which components can evasion be deterred.

The study suggests that the impact of multi-component reporting requirements on specific taxpayers depends crucially on their evasion opportunity set. Taxpayers with multiple evasion opportunities manage misstatement across components to minimize both the direct and indirect effects of detection factors. Taxpayers with limited evasion opportunities pursue them less aggressively in the multi-component model than in a comparable single-report model. In auditing reports with multiple potential misstatements, the tax authority benefits from joint cost efficiencies, positive correlation of true values, and sequential audit strategies as a means to update its evasion expectations. Overall, multi-component reporting requirements appear to deter evasion and increase tax authority revenue collections. However, the current study is limited in that it examines a single partition of taxable income and ignores taxpayer compliance costs. Further study is needed before these results can be generalized for policy-making purposes.

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[19] Similar results are obtained in a comparison to equilibrium II.

The findings from this study have implications for policy makers and both theoretical and empirical research on tax compliance. From a policy perspective, increases in net revenue collections can be achieved through obvious means, such as increasing tax and penalty rates, and decreasing audit costs. Revenue increases may also be achieved by additional component reporting requirements, particularly when component reporting allows the tax authority to identify those reports for which deterrence and/or detection is cost effective. Component reporting requirements also may allow the tax authority to take advantage of positive correlation between underlying component true values to detect or limit evasion opportunities. Results from this study suggest that positive correlation of component true values increases net revenue collections in a multi-component reporting environment.

This study also has implications for empirical research on tax compliance issues. Many existing empirical studies examine only aggregate noncompliance, ignoring the individual components of taxable income. This paper suggests that the mixed results reported by these studies may be due in part to confounding related to this aggregation. Future empirical studies must consider how differences in the probability of tax authority detection across taxable income components can undermine the assumption of a constant probability of audit for all tax return components of taxpayers in a given audit class. Future theoretical work on tax compliance should also be sensitive to the differential information content of component reports, even though multidimensional reports necessarily increase the complexity of the model.

APPENDIX

This appendix contains proofs of Lemma 1 and Propositions 1 and 2. Proofs of the comparative statics of tables 2 and 3 are then briefly described. Detailed proofs of these comparative statics are available on request from the author.

Proof of Lemma 1

Part (a) of Lemma 1 implies that $\rho_A^{\hat{H}\hat{B}} = 0$ for all $\hat{B}$ and $\rho_B^{\hat{A}\hat{H}} = 0$ for all $\hat{A}$. To see that this is optimal, note that the tax authority's payoff from not verifying a report $\hat{A}_H$ is $t\hat{A}_H$. The maximum possible payoff from verifying a report $\hat{A}_H$ is $t\hat{A}_H - c_A$, which is strictly less than $t\hat{A}_H$ for any $c_A > 0$. The optimality of $\rho_B^{\hat{A}\hat{H}} = 0$ can be shown in the same manner. Thus, all $\rho_A^{\hat{H}\hat{B}} > 0$ and $\rho_B^{\hat{A}\hat{H}} > 0$ are eliminated as strongly dominated strategies.

Once the tax authority strategies of part (a) of Lemma 1 are eliminated, the taxpayer strategies in part (b) are then strongly dominated and can be eliminated. Part (b) of Lemma 1 implies that any untruthful report is dominated for a taxpayer observing y_{LL}. First, note that the tax liability paid by an LL-type taxpayer reporting truthfully is $t\hat{y}_{LL}$. If the LL-type taxpayer overreports item A, such a report will be accepted as filed since item B is truthfully reported and, from part (a) of Lemma 1, $\rho_A^{\hat{H}\hat{L}} = 0$. However, $t\hat{y}_{HL} > t\hat{y}_{LL}$, since $\hat{y}_{HL} > \hat{y}_{LL}$. Thus, the LL-type strictly prefers truthful reporting to reporting $\hat{y}_{HL}$. Using analogous reasoning, the report $\hat{y}_{LH}$ is strongly dominated, since $\hat{y}_{LH} > \hat{y}_{LL}$. Finally, part (a) of Lemma 1 implies that neither component of a report $\hat{y}_{HH}$ will be verified. The LL-type strictly prefers truthful reporting to reporting $\hat{y}_{HH}$, as $t\hat{y}_{HH} > t\hat{y}_{LL}$.

Part (c) of Lemma 1 provides that taxpayers observing y_{HL} or y_{LH} never report $\hat{y}_{HH}$. Such reports are strongly dominated, after consideration of part (a), since $t\hat{y}_{HH} > t\hat{y}_{LH}$ and $t\hat{y}_{HH} > t\hat{y}_{HL}$.

Proof of Proposition 1

Equilibrium I

Let $A^C = t(1 + \pi)A_\Delta$ and $B^C = t(1 + \pi)B_\Delta$. The following taxpayer reporting probabilities are observed in this equilibrium:

$$\lambda_{LH}^{\hat{L}\hat{L}} = \frac{\alpha_{LL}c_B}{\alpha_{LH}(B^C - c_B)} \tag{A1}$$

$$\lambda_{HL}^{\hat{L}\hat{H}} = \frac{\alpha_{LL}(c_A + c_{FA})}{\alpha_{HL}(A^C - c_A - c_{FA})} \tag{A2}$$

$$\lambda_{HH}^{\hat{L}\hat{H}} = \frac{(c_A + c_{FA})[\alpha_{LH}B^C - (\alpha_{LH} + \alpha_{LL})c_B]}{\alpha_{HH}(B^C - c_B)(A^C - c_A - c_{FA})} \tag{A3}$$

$$\lambda_{HH}^{\hat{H}\hat{L}} = \frac{(c_B + c_{FB})[\alpha_{HL}A^C - (\alpha_{HL} + \alpha_{LL})(c_A + c_{FA})]}{\alpha_{HH}(B^C - c_B - c_{FB})(A^C - c_A - c_{FA})} \tag{A4}$$

$$\lambda_{HH}^{\hat{L}\hat{L}} = \frac{\alpha_{LL}c_B(c_A + c_{FA})}{\alpha_{HH}(A^C - c_A - c_{FA})(B^C - c_B)} \tag{A5}$$

$$\lambda_{HH}^{\hat{H}\hat{H}} = 1 - \lambda_{HH}^{\hat{L}\hat{H}} - \lambda_{HH}^{\hat{H}\hat{L}} - \lambda_{HH}^{\hat{L}\hat{L}} \tag{A6}$$

The following boundary conditions define this equilibrium:

$$A^C - c_A - c_{FA} > 0 \tag{A7}$$

$$B^C - c_B - c_{FB} > 0 \tag{A8}$$

$$\alpha_{HL}A^C - (\alpha_{HL} + \alpha_{LL})(c_A + c_{FA}) > 0 \tag{A9}$$

$$\alpha_{HH}A^C - (\alpha_{HH} + \alpha_{LH})(c_A + c_{FA}) > 0 \tag{A10}$$

$$\alpha_{LH}B^C - (\alpha_{LH} + \alpha_{LL})c_B > 0 \tag{A11}$$

$$\begin{aligned}&\alpha_{HH}A^CB^C + (c_A + c_{FA})(c_B + c_{FB})\\ &\quad - B^C(\alpha_{LH} + \alpha_{HH})(c_A + c_{FA}) - A^C(\alpha_{HL} + \alpha_{HH})(c_B + c_{FB}) > 0\end{aligned} \tag{A12}$$

Using (A7) through (A12), (A1) through (A6) are within the interval (0,1).

Verification of Equilibrium. To confirm equilibrium, it is sufficient to show that each player has no incentive to deviate from the prescribed strategy, given the other players' equilibrium strategies. Given the equilibrium audit strategies defined in proposition 1, the LH-type taxpayer's equilibrium payoff from strategy (A1) is:

$$T[y_{LH}, \lambda_{LH}^{*}] = y_{LH}(1 - t) \tag{A13}$$

which equals the LH-type taxpayer's payoff from honest reporting. The LH-type taxpayer's payoff from deviating to report $\hat{y}_{HL}$ is:

$$T[y_{LH}, \lambda_{LH}^{\hat{H}\hat{L}}] = y_{LH} - t\hat{y}_{HL} - tB_{\Delta} = y_{LH} - t\hat{y}_{HH}. \tag{A14}$$

Given Lemma 1, (A14) < (A13) and the LH-type taxpayer prefers not to deviate.

The HL-type taxpayer's equilibrium payoff from strategy (A2) is:

$$T[y_{HL}, \lambda_{HL}^{*}] = y_{HL}(1 - t) \tag{A15}$$

which equals the HL-type taxpayer's payoff from honest reporting. The HL-type taxpayer's payoff from deviating to report $\hat{y}_{LH}$ is:

$$T[y_{HL}, \lambda_{HL}^{\hat{L}\hat{H}}] = y_{HL} - t\hat{y}_{LH} - tA_{\Delta} = y_{HL} - t\hat{y}_{HH}. \tag{A16}$$

Given Lemma 1, (A16) < (A15) and the HL-type taxpayer prefers not to deviate.

The HH-type taxpayer's payoff from strategies (A3) through (A6) is:

$$T[y_{HH}, \lambda_{HH}^{*}] = y_{HH}(1 - t) \tag{A17}$$

which equals the HH-type taxpayer's payoff from honest reporting. The HH-type taxpayer reports all four potential reports with some positive probability, receiving payoff (A17). Thus, this taxpayer has no incentive to deviate, as the taxpayer cannot achieve a different payoff, given the equilibrium audit strategies.

The tax authority's payoff from its equilibrium strategy for auditing $\hat{y}_{LH}$ is:

$$TA[\hat{y}_{LH}, \rho_{A}^{\hat{L}\hat{H}}] = t\hat{y}_{LH}. \tag{A18}$$

Deviation to any alternative audit strategy produces the same payoff, so the tax authority has no incentive to deviate.

The tax authority's payoff from its equilibrium strategy for auditing $\hat{y}_{HL}$ is:

$$TA[\hat{y}_{HL}, \rho_{A}^{\hat{H}\hat{L}}] = t\hat{y}_{HL}. \tag{A19}$$

Deviation to any alternative audit strategy produces the same payoff, so the tax authority has no incentive to deviate.

The tax authority's payoff from its equilibrium strategy for auditing $\hat{y}_{LL}$ is:

$$TA[\hat{y}_{LL}, \rho_{A}^{\hat{L}\hat{L}}] = t\hat{y}_{LL}. \tag{A20}$$

Deviation to any alternative audit strategy involving auditing A first produces the same payoff, so the tax authority has no incentive to deviate. Deviating to any alternative audit strategy involving auditing B first produces a lower payoff, since, for this equilibrium, $c_{FB} > c_{FA}$. To demonstrate, consider deviation to the audit strategy in which $\rho_{B_1}^{\hat{L}\hat{L}} = 1/(1 + \pi)$, $\rho_{A_2|B_H}^{\hat{L}\hat{L}} = \rho_{A_2|B_L}^{\hat{L}\hat{L}} = 1$. The tax authority's payoff from this deviation is:

$$TA[\hat{y}_{LL}, \rho_{B}^{\hat{L}\hat{L}}] = t\hat{y}_{LL} - \frac{A^{C}[B^{C}(c_{FB} - c_{FA}) + \alpha_{HH}c_{B}c_{FB}]}{(1 + \pi)(\alpha_{HH} + \alpha_{LH})B^{C}(A^{C} - c_{A} - c_{FA})} - \frac{[\alpha_{HH}A^{C} - (\alpha_{HH} + \alpha_{LH})(c_{A} + c_{FA})][c_{B}(c_{A} + c_{FA}) + B^{C}(c_{FB} - c_{FA})]}{(1 + \pi)(\alpha_{HH} + \alpha_{LH})B^{C}(A^{C} - c_{A} - c_{FA})}. \tag{A21}$$

Using (A10) and $c_{FB} > c_{FA}$, (A21) < (A20) and the tax authority prefers not to deviate.

Equilibrium II

The following taxpayer reporting probabilities are observed in this equilibrium:

$$\lambda_{LH}^{\hat{L}\hat{L}} = \frac{\alpha_{LL}(c_B + c_{FB})}{\alpha_{LH}(B^C - c_B - c_{FB})} \tag{A22}$$

$$\lambda_{HL}^{\hat{L}\hat{L}} = \frac{\alpha_{LL}c_A}{\alpha_{HL}(A^C - c_A)} \tag{A23}$$

$$\lambda_{HH}^{\hat{L}\hat{H}} = \frac{(c_A + c_{FA})[\alpha_{LH}B^C - (\alpha_{LH} + \alpha_{LL})(c_B + c_{FB})]}{\alpha_{HH}(B^C - c_B - c_{FB})(A^C - c_A - c_{FA})} \tag{A24}$$

$$\lambda_{HH}^{\hat{H}\hat{L}} = \frac{(c_B + c_{FB})[\alpha_{HL}A^C - (\alpha_{HL} + \alpha_{LL})c_A]}{\alpha_{HH}(B^C - c_B - c_{FB})(A^C - c_A)} \tag{A25}$$

$$\lambda_{HH}^{\hat{L}\hat{L}} = \frac{\alpha_{LL}c_A(c_B + c_{FB})}{\alpha_{HH}(A^C - c_A)(B^C - c_B - c_{FB})} \tag{A26}$$

$$\lambda_{HH}^{\hat{H}\hat{H}} = 1 - \lambda_{HH}^{\hat{L}\hat{H}} - \lambda_{HH}^{\hat{H}\hat{L}} - \lambda_{HH}^{\hat{L}\hat{L}} \tag{A27}$$

This equilibrium occurs when the boundaries defined by (A7), (A8) and (A12) are satisfied, and the following conditions are met:

$$\alpha_{HL}A^C - (\alpha_{HL} + \alpha_{LL})c_A > 0 \tag{A28}$$

$$\alpha_{LH}B^C - (\alpha_{LH} + \alpha_{LL})(c_B + c_{FB}) > 0 \tag{A29}$$

$$\alpha_{HH}B^C - (\alpha_{HH} + \alpha_{HL})(c_B + c_{FB}) > 0 \tag{A30}$$

Given these boundary conditions, (A22) through (A27) are within the interval (0,1).

Verification of Equilibrium. The verification of equilibrium proceeds in the same manner as for equilibrium I and is therefore omitted.

Proof of Proposition 2

In a single report model of net taxable income, a taxpayer observing y_{ij} chooses λ_{ij}^s to maximize:

$$T[y_{ij}, \lambda_{ij}^s, \rho^s] = y_{ij} - t\sum_{s=1}^{4} \lambda_{ij}^s \hat{y}_s - t(1 + \pi)\sum_{s=1}^{4} \lambda_{ij}^s \rho^s (y_{ij} - \hat{y}_s). \tag{A31}$$

On observing a report $\hat{y}_s$, the tax authority chooses ρ^s to maximize:

$$TA[\rho^s, \hat{y}_s] = t\hat{y}_s + \rho^s t(1 + \pi)\sum_{k \neq s} \beta_k^s [(y_k - \hat{y}_s) - c] \tag{A32}$$

where β_k^s represents the tax authority's belief that the observed report $\hat{y}_s$ is misstated, and that the underlying true taxable income is y_k, $k \in \{1,2,3,4\}$. These beliefs are calculated using Bayes Rule, in the same manner described for Proposition 1.

The system defined by equations (A31) and (A32) is not well-specified, in the sense that its first-order conditions provide fewer equations than unknown variables. Thus, without further restrictions it cannot be solved. To solve the model and facilitate comparison to equilibrium I of Proposition 1, the following restrictions are imposed: $\lambda_{HH}^2 = \lambda_{HH}^{\hat{L}\hat{H}}$ from equilibrium I of Proposition 1, $\lambda_{HH}^3 = \lambda_{HH}^{\hat{H}\hat{L}}$ from equilibrium I of Proposition 1, and $\lambda_{LH}^3 = \lambda_{HL}^2 = 0$. Given these restrictions, equilibrium reporting and auditing strategies for the single report model are:

$$\lambda_{LH}^1 = \frac{c_B[\alpha_{LH}A^C(B^C - c_B) + \alpha_{LL}(c_A + c_F)(A^C - c)]}{\alpha_{LH}c(B^C - c_B)(A^C - c_A - c_F)} \tag{A33}$$

$$\lambda_{HL}^1 = \frac{[\alpha_{HL}B^Cc_A(A^C - c_A - c_F) + \alpha_{LL}(c_A + c_F)(c_B + c_F)(B^C - c)]}{\alpha_{HL}c(B^C - c_B - c_F)(A^C - c_A - c_F)} \tag{A34}$$

$$\begin{aligned}\lambda_{HH}^1 = {} & \frac{\alpha_{LL}c}{\alpha_{HH}(A^C + B^C - c)} - \frac{c_B(B^C - c)[\alpha_{LH}A^C(B^C - c_B) + (c_A + c_F)(A^C - c)]}{\alpha_{HH}c(B^C - c_B)(A^C + B^C - c)(A^C - c_A - c_F)} \\ & - \frac{(A^C - c)[\alpha_{HL}B^Cc_A(A^C - c_A - c_F) + \alpha_{LL}(c_A + c_F)(c_B + c_F)(B^C - c)]}{\alpha_{HH}c(B^C - c_B - c_F)(A^C + B^C - c)(A^C - c_A - c_F)}\end{aligned} \tag{A35}$$

$$\rho^1 = \rho^2 = \rho^3 = \frac{1}{(1 + \pi)} \tag{A36}$$

Boundary conditions (A9) through (A12), (A28) through (A30) and the following define this equilibrium:

$$A^C - c > 0 \tag{A37}$$

$$B^C - c > 0 \tag{A38}$$

Given these conditions, (A33) through (A35) are within the interval (0,1).

Verification of Equilibrium. The verification of equilibrium proceeds in the same manner as for equilibrium I and is therefore omitted.

To prove part (a)(i) of Proposition 2, using (A33) through (A35) and (A1) through (A5), note that:

$$\lambda_{LH}^1 - \lambda_{LH}^{\hat{L}\hat{L}} = \frac{A^Cc_B\alpha_{LL}[\alpha_{LH}B^C - (\alpha_{LL} + \alpha_{LH})c_B]}{\alpha_{LH}c(A^C - c_A - c_F)(B^C - c_B)} > 0 \tag{A39}$$

$$\lambda_{HL}^1 - \lambda_{HL}^{\hat{L}\hat{L}} = \frac{B^Cc_A[\alpha_{HL}A^C - (\alpha_{HL} + \alpha_{LL})(c_A + c_F)]}{\alpha_{HL}c(A^C - c_A - c_F)(B^C - c_B - c_F)} > 0 \tag{A40}$$

$$\lambda^{1}_{HH} - \lambda^{\hat{L}\hat{L}}_{HH} = \frac{c_A B^C(A^C - c)[\alpha_{HL}A^C - (\alpha_{HL} + \alpha_{LL})(c_A + c_F)]}{\alpha_{HH}c(A^C + B^C - c)(A^C - c_A - c_F)(B^C - c_B - c_F)} + \frac{c_B A^C(B^C - c_B - c_F)[\alpha_{LH}B^C - (\alpha_{LH} + \alpha_{LL})c_B - \alpha_{LL}c_A]}{\alpha_{HH}c(A^C + B^C - c)(A^C - c_A - c_F)(B^C - c_B)} + \frac{c_B A^C[c_A c_F \alpha_{LH}(B^C - c_B - c_F) + \alpha_{LL}c_B(c_A B^C - (c_A + c_F))]}{\alpha_{HH}c(A^C + B^C - c)(A^C - c_A - c_F)(B^C - c_B - c_F)(B^C - c_B)} < 0 \quad \text{(A41)}$$

$$\lambda^{1}_{HH} + \lambda^{2}_{HH} + \lambda^{3}_{HH} - \lambda^{\hat{L}\hat{L}}_{HH} - \lambda^{\hat{L}\hat{H}}_{HH} - \lambda^{\hat{H}\hat{L}}_{HH} = \text{equation(A40)} < 0 \quad \text{(A42)}$$

To prove part (a)(ii) of Proposition 2, note that:

$$x^1 - x^{\hat{L}\hat{L}}_A - x^{\hat{L}\hat{L}}_B =$$

$$\frac{A^C c_B[B^C\alpha_{LH} - (\alpha_{LH} + \alpha_{LL})c_B]}{c(1 + \pi)(B^C - c_B)(A^C - c_A - c_F)(A^C + B^C - c)} + \frac{(B^C)^2(B^C - c_A c_B)[A^C\alpha_{HL} - (\alpha_{HL} + \alpha_{LL})(c_A + c_F)]}{c(1 + \pi)(B^C - c_B)(A^C - c_A - c_F)(B^C - c_B - c_F)(A^C + B^C - c)} + \frac{B^C c_F[(\alpha_{HL} + \alpha_{LL})(B^C - c_A)]}{c(1 + \pi)(B^C - c_B)(A^C - c_A - c_F)(B^C - c_B - c_F)(A^C + B^C - c)} > 0 \quad \text{(A43)}$$

$$x^2 - x^{\hat{L}\hat{H}}_A = 0 \quad \text{(A44)}$$

$$x^3 - x^{\hat{H}\hat{L}}_B = 0 \quad \text{(A45)}$$

To prove part (b) of Proposition 2, define $E(TA_S)$ as the net revenue collections from a single report model of net taxable income. Then:

$$E(TA) - E(TA_S) = \frac{(B^C)^2 c_A[\alpha_{HL}A^C - (\alpha_{HL} + \alpha_{LL})(c_A + c_F)]}{(1 + \pi)(B^C - c_B - c_F)(A^C - c_A - c_F)(A^C + B^C - c)} + \frac{(A^C)^2 c_B[\alpha_{LH}B^C - (\alpha_{LH} + \alpha_{LL})c_B]}{(1 + \pi)(B^C - c_B)(A^C - c_A - c_F)(A^C + B^C - c)} > 0. \quad \text{(A46)}$$

Proofs for Comparative Statics reported in Tables 2 and 3

The results reported in table 2 reflect the partial derivatives of equilibrium taxpayer reporting strategies, as specified above for each equilibrium, for each variable of interest. Equilibrium tax authority net revenue collections, E(TA), are calculated using the equilibrium strategies reported above for Proposition 1 and equation (7) from the body of the paper. The results reported in line 1 of table 3 reflect the partial derivatives of such equilibrium net revenues for each variable of interest. Equilibrium probabilities of detected evasion ($x^{\hat{i}\hat{i}}_A$ and $x^{\hat{i}\hat{j}}_B$) are calculated using the equilibrium strategies reported above for Proposition 1 and equations (8) and (9) from the body of the paper. The results reported in table 3 reflect the partial derivatives of such equilibrium probabilities for each variable of interest.

REFERENCES

Asare, S. 1992. The auditor's going-concern decision: Interaction of task variables and the sequential processing of evidence. *The Accounting Review* 67 (April): 379–393.

Beck, P. J., and W. Jung. 1989. Taxpayers' reporting decisions and auditing under information asymmetry. *The Accounting Review* 64 (July): 468–487.

Dubin, J. A., and L. L. Wilde. 1988. An empirical analysis of federal income tax auditing and compliance. *National Tax Journal* (March): 61–74.

Erard, B., and J. S. Feinstein. 1994. Honesty and evasion in the tax compliance game. *RAND Journal of Economics* 25 (Spring): 1–19.

Feinstein, J. S. 1991. An econometric analysis of income tax evasion and its detection. *RAND Journal of Economics* 22 (Spring): 14–35.

Graetz, M. J., J. R. Reinganum, and L. L. Wilde. 1986. The tax compliance game: Toward an interactive theory of law enforcement. *Journal of Law, Economics and Organization* 2 (1): 1–32.

Henry, J. S. 1988. Rich pickings: Who the tax cheats are and how to get at them. *The New Republic* 199 (October): 23–25.

Herman, T. 1995. Accounting—rare reprieve: IRS postpones its superaudits. *Wall Street Journal* (October 24): B1.

Klepper, S., and D. Nagin. 1989. The anatomy of tax evasion. *Journal of Law, Economics and Organization* 5 (1): 1–24.

Knechel, R., and W. Messier. 1990. Sequential auditor decision making: Information search and evidence evaluation. *Contemporary Accounting Research* (Spring): 386–406.

Morton, S. 1993. Strategic auditing for fraud. *The Accounting Review* (October): 825–839.

Nagin, D. S. 1990. Policy options for combating tax noncompliance. *Journal of Policy Analysis and Management* 9 (1): 7–22.

Newman, P., S. Rhoades, and R. Smith. 1996. Allocating audit resources to detect fraud. *Review of Accounting Studies* 1 (2): 161–182.

Reinganum, J. F., and L. L. Wilde. 1986. Equilibrium verification and reporting policies in a model of tax compliance. *International Economic Review* 27 (Spring): 739–760.

Sansing, R. C. 1993. Information acquisition in a tax compliance game. *The Accounting Review* 68 (October): 874–884.

Witte, A. D., and D. F. Woodbury. 1985. The effect of tax laws and tax administration on tax compliance: The case of the U.S. individual income tax. *National Tax Journal* 38 (March): 1–13.

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Negotiated Transfer Pricing and Divisional vs. Firm-Wide Performance Evaluation

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ABSTRACT: A firm with two divisions, each run by a risk-averse manager, contracts with the two managers to operate their divisions and possibly engage in interdivisional trade. Each division can increase the total surplus generated through interdivisional trade by making costly relationship-specific investments. The terms of trade are determined through negotiations between the two managers. Managerial compensation contracts are linear functions of divisional profit and firm-wide profit. If managers are compensated solely on the basis of their divisional profits, they invest less than the first-best amounts. While compensation contracts based on firm-wide profits alone can induce first-best investments, they impose extra risk on risk-averse managers. Therefore, we find that optimal linear compensation contracts will contain both divisional and firm-wide components. Our analysis also identifies a feature of negotiated transfer pricing, namely interdivisional risk sharing, and characterizes its impact on the design of optimal contracts.

Key Words: *Performance evaluation, Transfer pricing, Investment, Hold-up problem.*

I. INTRODUCTION

In multidivisional firms, divisional interests often conflict with the goal of firm-wide profit maximization. Transfer pricing and managerial performance evaluation are two key instruments that firms use to manage potential conflicts. In this paper, we analyze the role of these two institutions in providing incentives for divisional managers to balance the interests of their own divisions against the good of the firm. In particular, we examine how managerial compensation contacts use divisional and firm-wide performance measures

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in conjunction with negotiated transfer pricing to influence the way division managers balance divisional and firm-wide goals.

We characterize the conflict between divisional and firm-wide interests as an investment "hold-up" problem, identified by Williamson (1985) and others. We model a firm with two divisions; each division is an autonomous profit-generating entity managed by a risk- and effort-averse manager. In addition to their independent external operations, the divisions can trade an intermediate product with each other. Prior to determining the terms of interdivisional trade, the divisions can make costly, relationship-specific investments to increase the total surplus generated by their internal trade. For instance, the supplying division may invest in production technology to reduce the variable cost of production. Similarly, the buying division may enhance its revenues by investing in market research or advance promotion.

If the firm uses negotiated transfer pricing for the interdivisional transfer, then each manager invests anticipating that, while his division will have to bear the full cost of its investment, it will get only a portion of the returns. If the division managers are rewarded on the basis of their division profits, they will invest less than the first-best amounts. This disincentive to invest constitutes the investment hold-up problem.

In this paper, we focus on resolution of the investment hold-up problem through managerial performance evaluation. In particular, we consider the role of linear compensation contracts based on divisional profits and firm-wide profits.[1] Our analysis establishes a trade-off between inducing efficient investments and imposing risk on risk-averse managers. We demonstrate that first-best investments can be induced if the managers are rewarded solely on the basis of firm-wide profit. Such contacts are never optimal, however, since they impose excessive risks on the managers. It is also not optimal to reward managers only on the basis of their division profits, as this practice leads to an excessive loss of investment efficiency. Our analysis shows that the optimal linear contracts will contain both divisional and firm-wide performance measures.[2]

We also identify an important characteristic of negotiated transfer pricing that impacts the design of optimal contracts, but has not been previously recognized in the literature. In our model, costs and revenues associated with interdivisional trade are subject to random shocks that are realized after the two managers have negotiated the terms of trade. Consequently, under negotiated transfer pricing division managers share not only the expected surplus, but also the residual risk connected with interdivisional trade. If the managers were risk-neutral, this interdivisional risk-sharing would have no implication for the firm's welfare. When managers are risk-averse, however, risk sharing allows the firm to lower its expected compensation costs.

The impact of interdivisional risk-sharing on the design of optimal contacts can be best illustrated in a case where only one division, say the buying division, has an investment opportunity. In this case, there is no need to provide investment incentives to the manager of the supplying division. We find, however, that the supplying division manager's optimal contract will still place weight on both divisional and firm-wide profits. The reason is that interdivisional risk sharing makes accrued divisional profits positively correlated. This correlation allows the firm to reduce the amount of risk that needs to be imposed on the manager of the supplying division using relative performance evaluation, that is, by tying a part of the supplying division manager's compensation to the buying division's profits.

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[1] We are primarily interested in factors that influence the trade-off between firm-wide and divisional performance measures. Thus, we do not consider more disaggregated performance measures. We simply assume that firms write linear contracts on division profit, firm-wide profit or a combination of the two.

[2] In our analysis, we assume that divisional cash flows are not correlated. Consequently, in the absence of an investment hold-up problem, there is no need for firm-wide performance evaluation. In a setting without investment, the optimal linear contract for each manager will be based only on his or her division profits.

The buying division manager's contract optimally places weight on both divisional and firm-wide performance measures. The optimal weight on firm-wide profit is determined by the trade-off between two conflicting goals: (1) to induce investment, and (2) to reduce the risk through relative performance evaluation. When both managers have the opportunity to invest, a similar trade-off determines the optimal weights on firm-wide performance.

As mentioned above, negotiated transfer pricing plays a critical role in determining the characteristics of optimal contracts. To illustrate the interaction of negotiated transfer pricing and firm-wide performance evaluation in contracting, we again turn to the case where the buying division has the investment opportunity. We compare the effect of using negotiated transfer pricing with that of requiring the buyer simply to reimburse the seller for realized production costs, which would be more reflective of cost-based transfer pricing.

The latter scheme allocates the entire surplus to the buying division.[3] The buyer will make the first-best investment without any firm-wide component in his or her compensation contract. The seller has no investment issue and no profit from interdivisional trade. Thus the selling manager's contract needs no firm-wide component. This may be an efficient arrangement if the buying division's investment has a relatively large impact on the trading surplus. This has led to the argument that an efficient mechanism allocates the entire trading surplus to the division with the investment opportunity.[4] We show that this argument is not valid, however, when managers are risk averse. Such schemes are inefficient from a risk-sharing perspective because they allocate all the residual risk of interdivisional trade to the buying division. Central management may prefer to endure a loss of investment efficiency and use negotiated transfer pricing rather than distort managerial risk sharing using the alternative scheme.

Other studies have looked at various approaches to dealing with the investment hold-up problem. Edlin and Reichelstein (1995) show that efficient investments can be achieved when the managers can commit to contracts prior to making their investment decisions. In this paper, however, we take the view that prior contracts may be difficult to enforce if all the relevant characteristics of the transferred good or service cannot be specified in advance. Instead, we focus on the solution of the investment hold-up problem through managerial performance evaluation.[5,6]

Holmstrom and Tirole (1991) also examine the investment hold-up problem between two divisions in a decentralized firm. As in our paper, their analysis focuses on the role of managerial compensation contracts in inducing investments. In their model, however, managerial compensation contracts are not allowed to be contingent on firm-wide profits. Their analysis does not focus on trade-offs between divisional and firm-wide performance measures.[7]

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[3] This scheme can also be implemented in our setting by an asymmetric assignment of decision rights. For instance, if the buying division is assigned complete authority over the terms of trade, then it will extract the entire surplus by paying the supplying division its variable costs.

[4] See, for instance, Grossman and Hart (1986).

[5] Edlin and Reichelstein (1995) do not consider the issue of risk-sharing as the managers are assumed to be risk neutral. Under the assumption of risk neutrality, compensating divisional managers on the basis of firm-wide profits alone can also solve the investment hold-up problem.

[6] Sahay (1997) shows that a selling division's investment incentives can be improved by allowing for markups on variable cost transfers.

[7] Other studies examining the trade-offs between divisional and firm-wide performance evaluation with risk-averse managers are Bushman et al. (1995) and Darrough and Melumad (1995).

In contrast to the approach in this paper, many papers have analyzed the performance evaluation and transfer pricing problems using the theory of mechanism design. Under the mechanism design framework, the main focus is on deriving an optimal mechanism that induces divisional managers to reveal their private information. This approach has been used by Amershi and Cheng (1990), Antle and Eppen (1985), Harris et al. (1982), Vaysman (1996) and Christensen and Demski (1996).

The plan of this paper is as follows. Section II describes the basic setup of the model. Section III examines the properties of optimal linear contracts under negotiated transfer pricing, and illustrates how risk sharing, investment incentives and firm welfare depend on the transfer pricing scheme. Section IV concludes the paper.

II. THE MODEL

Technology

We characterize the performance measurement problem of a two-division firm with a risk-neutral principal which we call central management and two risk-averse, effort-averse agents, division managers 1 and 2, respectively.

Each division has profit from its own operations. We assume that the net profit of these operations for division i is a function of manager i's effort level a_i, and a random variable $\tilde{e}_i$. Let $X_i(a_i) + \tilde{e}_i$ denote this profit for division i. We assume that $\tilde{e}_i \in (-\infty, \infty)$, has mean 0 and variance σ_i, and that the functions X_i are strictly increasing, concave, and twice differentiable.

In addition to the above operations, an intermediate product can be produced in division 1 and transferred to division 2. We assume that the intermediate product is highly specialized and has no external market. Throughout the analysis we refer to the transfer of the intermediate good in terms of its quantity, q. However, the variable q need not be restricted to such a narrow interpretation. It may also refer to some other characteristic of the transferred good, such as its quality.

The cost to division 1 of producing q units of the intermediate product is an increasing function of q, and a decreasing function of a level of investment I_1 borne by division 1. This function takes the form $C(q, I_1) + \tilde{u}_1$, where $\tilde{u}_1$ has mean 0 and variance σ_{u1}. Division 2 earns net revenue R from the transfer, where R is an increasing function of q and a level of investment I_2 borne by division 2. This function takes the form $R(q, I_2) + \tilde{u}_2$, where $\tilde{u}_2$ has mean 0 and variance σ_{u2}. The terms $\tilde{u}_i$ represent uncertainty in total upstream or downstream costs incurred on the product. In addition, we assume that if $q = 0$, all revenue and cost are avoided; in particular $\tilde{u}_1 = \tilde{u}_2 = 0$. The function R is assumed to be strictly increasing, concave, and twice differentiable in q for all I_2; and C is strictly increasing, convex, and twice differentiable in q for all I_1. Further, we assume that the expected contribution margin, $R(\cdot, I_2) - C(\cdot, I_1)$, is strictly concave in q for all I_1 and I_2. We assume that all random variables are independent of one another.

For given investments I_1 and I_2, let $q^*(I_1, I_2)$ denote the optimal quantity choice for the firm. That is:

$$q^*(I_1, I_2) = \arg\max_{q \geq 0} E[R(q, I_2) + \tilde{u}_2 - C(q, I_1) - \tilde{u}_1].$$

We assume that q^* is an interior point for all I_1, I_2, u_1, u_2. And we let $M(I_1, I_2)$ denote the expected contribution margin at the optimal quantity choice. The firm's investment choice problem under full information is:[8]

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[8] While our model deals with investments, it is a one-period model. This means that divisional and firm profits are reduced by the full cost of investments.

$$\underset{I_1,\, I_2}{\text{Maximize}}\ M(I_1, I_2) - I_1 - I_2. \tag{1}$$

We further assume the second-order condition,

$$M_{11} < 0 \quad \text{and} \quad M_{11}M_{22} - M_{12}^2 > 0 \tag{A1}$$

holds for all I_1, I_2. Assumption (A1) and the Envelope Theorem imply that the first-best investments, (I_1^*, I_2^*), exist and satisfy

$$\frac{\partial R(q^*, I_2^*)}{\partial I_2} = 1 \quad \text{and} \quad -\frac{\partial C(q^*, I_1^*)}{\partial I_1} = 1. \tag{2}$$

In addition, we assume the following:

$$\frac{\partial^2 C}{\partial q \partial I_1} < 0 \quad \text{and} \quad \frac{\partial^2 R}{\partial q \partial I_2} > 0. \tag{A2}$$

Assumption (A2) states that investment increases marginal revenue and decreases marginal cost. It implies that the optimal quantity function, $q^*(\cdot,\cdot)$, is increasing in both its arguments.

Preferences, Information and Contracts

We assume the division managers are effort and risk averse, with expected utility given by

$$EU_i(\tilde{S}_i, a_i) \equiv E(\tilde{S}_i) - \frac{1}{2}\rho_i \operatorname{var}(\tilde{S}_i) - V_i(a_i),$$

where ρ_i is the coefficient of risk aversion, S_i denotes the manager's compensation, and $V_i(a_i)$ is the manager's personal cost of supplying effort a_i. We assume that $V_i(\cdot)$ is strictly increasing, strictly convex, and twice differentiable.[9]

In our model, we assume the firm is decentralized in the sense that central management cannot observe the agents' actions or investments. We also assume that, for the purpose of performance evaluation, central management uses only the aggregate divisional profits,

$$\tilde{\pi}_1 = X_1(a_1) + \tilde{e}_1 - C(q, I_1) - \tilde{u}_1 - I_1 + t, \tag{3}$$

$$\tilde{\pi}_2 = X_2(a_2) + \tilde{e}_2 + R(q, I_2) + \tilde{u}_2 - I_2 - t, \tag{4}$$

where t denotes the transfer payment from division 2 to division 1 for supplying q units of the intermediate product.

We restrict our analysis to compensation contracts in which the wage payments are linear functions of the performance measures $\tilde{\pi}_1$ and $\tilde{\pi}_2$. Thus, contracts take the form $S_i = \omega_i + \alpha_i\pi_i + \beta_i\pi_j$, where α_i is the weight in manager i's contract on the profit of division i, and β_i is the weight in manager i's contract on the profit of division j. This means that with two divisions, the contract places β_i weight on firm-wide income and $\alpha_i - \beta_i$ on the profit of division i. So $S_i = \omega_i + \gamma_i\pi_i + \beta_i\pi_F$, where $\gamma_i = \alpha_i - \beta_i$ and $\pi_F = \pi_i + \pi_j$.

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[9] In the case where the random variables $\tilde{e}_i$ and $\tilde{u}_i$ and are normally distributed and contracts are linear, we may derive this function as a certainty equivalent by assuming a utility function given by $-e^{-\rho_i[S_i - V_i(a_i)]}$.

Our assumptions that contracts are linear and based on aggregate division and firm profit merit further discussion. Following the work of Holmstrom and Milgrom (1987), the literature on contracting commonly utilizes the linear contract assumption; we adopt it here for tractability reasons.[10] Limiting the set of contracting variables to π_i and π_F is restrictive. For example, it may be optimal to have contracts based on the transfer payment, or on divisional revenues, or costs. But such contracts do not appear to be common practice, whereas contracts based on divisional and firm profit are common (Bushman et al. 1995). This is perhaps because increasingly complex contracts are increasingly costly. Similar contract restrictions can be found in the models of Holmstrom and Tirole (1991), Edlin and Reichelstein (1995) and Baldenius (1998).[11]

Contracting in our model is the initial event in the following sequence:

Date 1	*Date 2*	*Date 3*	*Date 4*
Center signs contracts with managers.	(I_1, I_2) and (a_1, a_2) chosen.	Managers trade q and deterimine t; u_1 and u_2 realized.	Divisional profit realized; contracts settled.

At Date 2, managers choose their investment levels and their division-specific effort levels. Since no one except the managers observes these, the managers are unable to write enforceable contracts on them.[12] At Date 3, the division managers jointly determine the quantity and transfer payment. At this date, the division managers learn both division's cost and revenue through the common observation of the realizations of the u_i's.

The determination of q at Date 3 warrants some discussion. We assume that the managers must wait until Date 3 to determine q. The need to postpone the choice of q might arise because q depends on other events, not modeled here, that take place at Date 3. The choice might depend, for instance, on last minute knowledge of consumer preferences.[13]

Determining the Transfer Payment

The two division managers are free to choose any quantity and transfer price. While negotiating the quantity and transfer payment choice at Date 3, the division managers' incentives depend on their bonus coefficients β_i and α_i. These coefficients will determine each division manager's concern for his or her own division relative to the good of the firm in bargaining for the transfer payment. To ensure that there is a well-defined outcome to the negotiation, we only consider compensation contracts that put non-negative incremental weight on divisional profits. If $\beta_i > \alpha_i$ and $\beta_j \leq \alpha_j$, in particular, then the manager i would propose a very large transfer payment from division i to division j, which would be accepted by manager j.

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[10] See also Feltham and Xie (1994).

[11] A formal model that incorporates contracting costs is beyond the scope of this paper. For a paper that models these costs, see Melumad et al. (1997).

[12] Edlin and Reichelstein (1995), Baiman and Rajan (1995), Grossman and Hart (1986), and Holmstrom and Tirole (1991) make similar assumptions. See Hart (1995) for an overview of the incomplete contracting literature.

[13] This uncertainty can be formally introduced in our model. For example, we may let $C(q, I_1, \tilde{\theta}) = \hat{C}(I_1)q\tilde{\theta} + \tilde{u}_1$ and $R(q, I_2, \tilde{\theta}) = \hat{R}(I_2)q\tilde{\theta} - 1/2\ q^2\tilde{\theta}^2 + \tilde{u}_2$, where $\tilde{\theta} > 0$ is some common shock realized at Date 3. Then the optimal quantity is given by $q^* = [\hat{R}(I_2) - \hat{C}(I_1)]/\tilde{\theta}$, and the contribution margin at the optimal quantity will be $1/2[\hat{R}(I_2) - \hat{C}(I_1)]^2 + u_2 - u_1$. In this case, the optimal quantity choice is a function of the stochastic parameter $\tilde{\theta}$. Any contract made at Date 2, prior to the realization of $\tilde{\theta}$, might be improved through renegotiation at Date 3.

We assume that:

$$\beta_i \leq \alpha_i \qquad \text{for each i.} \tag{3A}$$

Further, we assume that if the contract leaves a manager indifferent, the manager will bargain in favor of the manager's own division.

Given this, it follows that the managers will bargain to maximize their own divisional profits. Note that their ability to carry out their trade agreement does not depend on its verifiability, but rather on the managers' common knowledge of their respective environments. It is in each division manager's interest to agree on the *ex post* surplus-maximizing choice of q at Date 3. At that point, the choice of investments has already been made, and the investment outlay of each division is irrelevant in the negotiation of the transfer payment. We represent negotiations by the Nash bargaining solution in which the two divisions share the surplus generated by the transfer equally. The transfer payment, which produces this equal sharing, is given by:

$$t = \frac{1}{2}\,[R(q^*, I_2) + C(q^*, I_1) + \tilde{u}_2 + \tilde{u}_2]$$

where the buyer reimburses the seller for half the actual cost and pays out half the actual revenues. For notational convenience, let $\tilde{u} \equiv \tilde{u}_2 - \tilde{u}_1$ and $\sigma_u \equiv \sigma_{u1} + \sigma_{u2}$. Given the above transfer payment, divisional profits are given by

$$\tilde{\pi}_1 = X_1(a_1) + \tilde{e}_1 + \frac{1}{2}\,[R(q^*, I_2) - C(q^*, I_1) + \tilde{u}] - I_1 \tag{5}$$

$$\tilde{\pi}_2 = X_2(a_2) + \tilde{e}_2 + \frac{1}{2}\,[R(q^*, I_2) - C(q^*, I_1) + \tilde{u}] - I_2 \tag{6}$$

The effect of the investment hold-up problem is apparent in the division-profit measures above. The marginal benefit accruing to each division of each dollar of investment is only half the marginal surplus. The selling division yields only half the cost savings per dollar of investment, while the buying division yields only half the revenue increase per dollar. First-best investment requires divisional profits to reflect the full cash benefit, cost savings or revenue increase, of each dollar of investment.

III. DIVISIONAL AND FIRM-WIDE PERFORMANCE EVALUATION

We let $EU_i(S_i(a_i, I_i), a_i)$ denote manager i's expected utility for a given contract S_i, effort choice a_i, and investment choice I_i. For notational simplicity, we suppress the choices of manager j in the expected utility of agent i. The Program P1, below, represents central management's contracting problem.

Program P1

$$\underset{a_i, I_i, \omega_i, \alpha_i, \beta_i}{\text{Maximize}}\; E(\pi_1 + \pi_2) - (\omega_1 + \omega_2) - (\alpha_1 + \beta_2)E(\pi_1) - (\alpha_2 + \beta_1)E(\pi_2)$$

subject to:

$$EU_1(S_1(a_1, I_1),a_1) \geq U_1 \qquad \text{(IR1)}$$

$$EU_2(S_2(a_2, I_2),a_2) \geq U_2 \qquad \text{(IR2)}$$

$$a_1 \in \arg\max_{a_1'} EU_1(S_1(a_1', I_1),a_1') \qquad \text{(IC1)}$$

$$a_2 \in \arg\max_{a_2'} EU_2(S_2(a_2', I_2),a_2') \qquad \text{(IC2)}$$

$$I_1 \in \arg\max_{I_1'} EU_1(S_1(a_1,I_1'),a_1) \qquad \text{(ICI1)}$$

$$I_2 \in \arg\max_{I_2'} EU_2(S_2(a_2,I_2'),a_2) \qquad \text{(ICI2)}$$

$$\beta_i \leq \alpha_i \; \forall i, \qquad \text{(CC)}$$

where U_j denotes the manager j's reservation utility.

Constraints IR1 and IR2 require that managers are guaranteed their reservation utilities. Constraints IC1 and IC2 ensure that effort choices are incentive compatible. That the two managers' investment choices are incentive compatible is assured by constraints ICI1 and ICI2. The last constraint (CC) reflects assumption (A3).

Given the structure of compensation contracts and utility:

$$EU_i(S_i(a_i, I_i), a_i) = \omega_i + \alpha_i E(\pi_i) + \beta_i E(\pi_j) - V_i(a_i) - \frac{1}{2}\rho_i\left(\alpha_i^2\sigma_i + \beta_i^2\sigma_j + \frac{1}{4}\sigma_u(\alpha_i + \beta_i)^2\right). \qquad (7)$$

Without loss of generality, we normalize U_j to 0 for each i. We know that the individual rationality constraints will hold with equality, so that the fixed payment to agent i will be

$$\omega_i = -\alpha_i E(\pi_i) - \beta_i E(\pi_j) + V_i(a_i) + \frac{1}{2}\rho_i\left(\alpha_i^2\sigma_i + \beta_i^2\sigma_j + \frac{1}{4}\sigma_u(\alpha_i + \beta_i)^2\right).$$

Thus, we can simplify program P1 by substituting the fixed portions of the agents' wages directly into the principal's objective function. Further, IC1, IC2, ICI1, and ICI2 can be replaced with their first-order conditions. These simplifications lead to the following maximization problem.

Program P2

$$\max_{I_i,a_i,\alpha_i,\beta_i} \sum_{i=1}^{2}\left[X_i(a_i) - V_i(a_i) - \frac{1}{2}\rho_i\left(\alpha_i^2\sigma_i + \beta_i^2\sigma_j + \frac{1}{4}\sigma_u(\alpha_i + \beta_i)^2\right) - I_i\right] + R(q^*, I_2) - C(q^*, I_1)$$

subject to:

$$\alpha_i X_i'(a_i) - V_i'(a_i) = 0 \; \forall i \qquad \text{(ICI)}$$

$$-\frac{1}{2}(\alpha_1 + \beta_1)\frac{\partial C}{\partial I_1} - \alpha_1 = 0 \qquad \text{(ICI1)}$$

$$\frac{1}{2}(\alpha_2 + \beta_2)\frac{\partial R}{\partial I_2} - \alpha_2 = 0 \qquad \text{(ICI2)}$$

$$\alpha_i \geq \beta_i \forall i \qquad \text{(CC)}$$

To ensure that the principal always finds it optimal to induce positive efforts from both managers, we make the following technical assumption:

$$\lim_{a_i \to 0} X_i'(a_i) \to \infty \quad \forall i \tag{A4}$$

It can be easily verified that (A4), in combination with the principal's first-order conditions for the effort choices, implies that $\alpha_i^* > 0$ for each i.

Before we discuss the results of this analysis, it is worthwhile to return briefly to our discussion of contracting based solely on divisional and firm-wide profit. As we state above, central management does not contract upon individual components of divisional profits in this model, but clearly if it could, it would benefit from doing so. In particular, one useful contracting variable in this model would be the transfer payment, $t = 1/2[R(q, I_2) + C(q, I_1) + \tilde{u}_1 + \tilde{u}_2]$, itself. Consider what would happen if contracts took the form $S_i = \omega_i + \alpha_i \pi_i + \beta_i \pi_j + \tau_i t$. The variable t is a less noisy contracting variable than is firm-wide profit. In this case, it can be shown that the optimal linear contract will place zero weight on firm-wide profit (i.e., $\beta_i^* = 0$). In our simple two-division firm it is clear that it would be worthwhile for contracts to utilize the transfer price rather than using firm-wide profit. But if a firm contained many divisions with different interdivisional transactions, contracting on each transfer payment would quickly become cumbersome. Firm-wide profit, on the other hand, remains a single contracting variable.

A pure firm-wide profit-sharing contract for a given agent in our model is one where equal weight is placed on the measured profit of each division. In other words, there is no incremental weight on division i's profit in agent i's contract, beyond that which comes through the firm-wide measure. Proposition 1 establishes the benchmark that such contracts yield first-best investment.

Proposition 1: Divisional investments are first best if and only if $\alpha_i = \beta_i$, $i = 1, 2$.

Proof

All proofs are in the appendix.

The proof shows that a pure profit-sharing contract induces each manager to internalize fully the surplus generated by the interdivisional transaction. Proposition 1 provides the benchmark contracts with which to compare the optimal contracts and investments. It also shows why central management will never choose contracts where $\beta_i > \alpha_i$ for both division managers. The firm would always be able to improve both risk sharing and investment by decreasing the firm-wide profit coefficient.

In our model, the underlying moral-hazard problem is two dimensional. In addition to the familiar effort-choice problem, the managers choose the levels of monetary investments in their divisions. Proposition 1 distinguishes the problem of inducing a monetary investment from that of inducing a manager to undertake personally costly effort. This contrasts with Feltham and Xie (1994) which examines a setting in which the agent faces a multi-dimensional choice of personally costly efforts. Superficially our two problems are similar. However, the manager considering an effort investment internalizes its cost fully because of effort aversion, whereas the same manager internalizes the monetary cost of investment only through its endogenous effect, if any, on his compensation. For this reason, by designating measured performance to be firm-wide profit, central management can insure first-best investment by paying the manager any fraction thereof. On the other hand, if the investment is personal effort rather than the firm's capital, the only way to achieve first-best investment is if the firm is sold to the manager.

The design of agents' contracts in this model balances the benefits from inducing more efficient investment choices against the cost of imposing firm-wide risk on risk-averse managers. In our initial examination of this trade-off, we turn to a special case where only division 2, the buying division, invests.[14] We will assume that $C(q, I_1) \equiv C(q)$. This simpler setting retains most of the ingredients of the problem, but holds constant the reaction of each agent's investment choice to that of the other agent. Note that, absent any contract weight on firm-wide performance, negotiated transfer pricing still motivates some revenue-enhancing investment by giving division 2 a share in the surplus. The following proposition describes the managers' optimal contracts when there is no risk associated with the interdivisional trade, in other words, when $\sigma_u = 0$.

Proposition 2: If only division 2 invests, and $\sigma_u = 0$, then:

i. $0 < \beta_2^* < \alpha_2^*$
ii. $\beta_1^* = 0$.

Proposition 2 shows that manager 2's optimal contract will contain both divisional and firm-wide performance measures. Thus, it is not optimal to compensate manager 2 solely on the basis of firm-wide profit and induce the first-best investment. It is also not optimal to reward him only on the basis of his division profit as it leads to an excessive loss of investment efficiency. This result illustrates a basic trade-off between inducing efficient investment and imposing risk on risk-averse managers. Since manager 1 has no investment opportunity, his optimal contract will include no firm-wide profit component.

The next proposition, however, shows that placing no weight on firm-wide profit is, in general, suboptimal in the contract of both managers, even if only one manager has the opportunity to invest.

Proposition 3: If only division 2 invests, and $\sigma_u > 0$, then:

i. $-b < \beta_2{}^* < \alpha_2{}^*$
ii. $\beta_1{}^* < 0$

where b is some positive number.

When there is residual uncertainty associated with interdivisional trade, there is an additional consideration that impacts the optimal weight on the firm-wide profit. A consequence of negotiated transfer pricing is that the division managers share not only the expected surplus, but also the residual risk associated with the interdivisional trade. This offers the firm an opportunity to reduce its expected compensation costs through relative performance evaluation.

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[14] The results where only the seller invests are analogous to those we derive here. In that case, the problem resembles the textbook issue of how to motivate a production department to cut costs when some of those costs are being passed on to another department.

Since inducing efficient investment is not a concern for the selling division, this role of firm-wide performance evaluation is most apparent in the contract of manager 1. Interdivisional risk-sharing makes division profits positively correlated, providing central management an opportunity to reduce the firm's expected compensation costs. The negative weight $\beta_1{}^*$ reflects the firm's use of this opportunity. In other words, the signal π_2 is used in manager 1's contract to remove the effect of common uncontrollable events that affect the interdivisional trade and, therefore, the accrued profit of division 1. We must stress that, in the absence of interdivisional risk-sharing, there is no scope for relative performance evaluation in this model since we assume that division cash flows are not correlated.

In manager 2's contract the optimal weight on firm-wide profit is determined by the relative magnitudes of the two opposing effects. A positive weight induces the manager to make more efficient investment; but it also distorts risk sharing. A negative weight sacrifices better investment for improved risk sharing. The sign of the coefficient depends on the relative importance of investment and risk premium reduction to the firm.

As with Proposition 2, Proposition 3 rules out pure profit-sharing contracts. This again implies that $I_1 < I_1^*$. One might suppose from Proposition 3 that if both managers had investment opportunities, then $\beta^* < \alpha^*$ would be true for both managers, and both would underinvest. We find, however, that if both managers can invest, then the principal might write a contract where $\beta_i{}^* = \alpha_i{}^*$, and induce manager i to undertake first-best investment. The reason is that if investment is bilateral, then the investments of the two divisions become complements. Investment on the part of division i increases the productivity of the investment of division j, providing more investment incentive to that manager. Proposition 4 provides the only restriction on the optimal contract weights in the case of bilateral investment.

Proposition 4: If both agents have investment opportunities, then $\beta_i{}^* < \alpha_i{}^*$ for at least one i.

Proposition 4 establishes that optimal contracts will always induce at least one manager to underinvest, relative to the first-best investment level that would result if $\beta_i{}^* = \alpha_i{}^*$ for both i. But it allows for first-best investment on the part of one manager. This result is unique to the setting where agents are risk averse. When managers are risk averse it may be cheaper to induce manager i to invest, by increasing the weight on the firm-wide profit in j's contract, than by imposing greater firm-wide performance risk on manager i. This the case particularly if ρ_i or σ_j is large. If managers were risk neutral both direct and indirect investment incentives would be equally costly.

In their analysis of the investment incentives of risk-averse division managers, Holmstrom and Tirole (1991) do not consider contracts with a firm-wide performance evaluation component, β_i, conjecturing that it would merely make contracts more costly. But our analysis has shown that firm-wide performance evaluation contributes to contracting in two significant ways. First, profit sharing induces managers to sacrifice divisional welfare and coordinate with other divisions for the firm. Second, it provides an incremental risk-sharing opportunity between central management and each manager. Moreover, the existence of complementarity between divisions allows central management indirect means of motivating costly investment, which is incrementally valuable when managers are risk averse.

We have assumed, up to this point, that the firm uses negotiated transfer pricing, allowing the managers to bargain over the terms of trade. We have observed how contracts are able to take advantage of the interdivisional risk sharing that is one result of this bargaining.

To illustrate this role of negotiated transfer pricing on the design of optimal contracts and firm welfare, we return to the case where only the buying division has an investment opportunity. It would seem to make sense, in this case, to use some form of cost-based transfer price that reimburses division 1 for the incremental production cost of any level of the intermediate good. At the same time the profit of division 2 fully reflects the trade surplus. Formally, if $t = C(q) + \tilde{u}_1$, then $\tilde{\pi}_1 = X_1(a_1) + \tilde{e}_1$ and $\tilde{\pi}_2 = X_2(a_2) + \tilde{e}_2 + R(q, I_2) - C(q) + \tilde{u}$. It follows that optimal contracts will set $\beta_1 = \beta_2 = 0$. For convenience, we refer to this type of transfer payment as cost-based and the underlying system as cost-based transfer pricing.[15]

Cost-based transfer pricing eliminates the usefulness of firm-wide performance evaluation both for investment and for risk sharing. Manager 2 internalizes the trade surplus and will choose the first-best levels of q and I_2 as long as $\alpha_2 > 0$. If managers were risk neutral, the firm would clearly be better off using cost-based transfer pricing. We also make the formal observation that, if there were no risk associated with interdivisional trade, cost-based transfer pricing would dominate negotiated transfer pricing.

Observation: If $\sigma_u = 0$ and only the buying division invests, then central management prefers cost-based transfer pricing to negotiated transfer pricing.

The observation highlights the value of negotiated transfer pricing, relative to cost-based transfer pricing; its value lies in the potential for risk-averse managers to share the residual risk connected with interdivisional trade. If $\sigma_u = 0$, then there is no such potential. If, however, $\sigma_u > 0$, then the relative rank of these two transfer pricing régimes will depend on the relative magnitude of two opposing forces: risk sharing and investment incentives. Negotiated transfer pricing is efficient with respect to risk sharing, but it leads to distorted investment incentives. On the other hand, cost-based transfer pricing leads to first-best investment without firm-wide performance evaluation. But this arrangement is inefficient from a risk-sharing perspective, because one party bears all the risk related to the interdivisional transfer. If this risk is more costly than the loss of division 2's investment efficiency, the firm is actually better off using negotiated transfer pricing.

To illustrate this trade-off, figure 1 depicts the firm's welfare under each regime as a function of σ_u in the case of unilateral investment. It shows that if σ_u is relatively large, the desirable risk-sharing properties of negotiated transfer pricing can more than offset its adverse effect on investment incentives.

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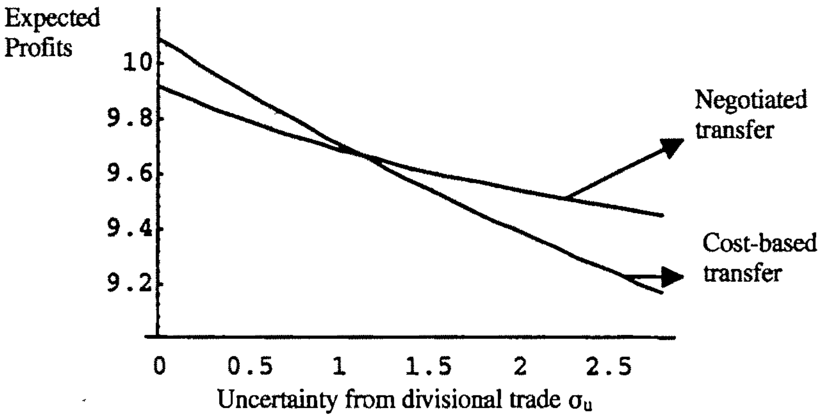
[15] When we refer to cost-based transfer pricing, we are interested in any scheme with the property that the seller is reimbursed for actual production costs. The practice of cost-based transfer pricing involves the unitization of costs and can encompass many refinements that we do not characterize here.

FIGURE 1
Expected Firm Profit and Uncertainty from Divisional Trade
Only Buying Division has Incentive to Invest
Negotiated vs. Cost-Based Transfers



The figure is generated using the following functional forms:

$$R(q, I_2) = (3 + \sqrt{I_2})q - 0.5q^2,$$
$$C(q, I_1) = 2q,$$
$$X_i(a_i) = a_i,$$
$$V_i(a_i) = 0.05a_i^2 \ \forall i.$$

All other parameters (σ_i and ρ_i) are set equal to 1.

The above trade-offs also exist in the case of bilateral investment, but the welfare comparison is also a function of the importance of the second investment.

IV. CONCLUSION

This analysis has examined how a decentralized firm can use divisional and firm-wide incentives to guide division managers to engage in interdivisional transactions and make costly divisional investments for the benefit of the firm. Underlying these incentive contracts is a fundamental trade-off between efficient risk sharing, which calls for division-based performance evaluation, and profit enhancing coordination, which calls for firm-wide performance evaluation. We have demonstrated that optimal compensation contacts will contain both divisional and firm-wide performance measures. Our analysis has also identified a characteristic of negotiated transfer pricing, namely interdivisional risk-sharing, that impacts the design of optimal compensation contacts, and reduces the firm's expected compensation costs.

We have shown that the need for firm-wide performance evaluation can be eliminated only if one manager somehow captures the entire surplus from the interdivisional trade. The desirability of implementing such a scheme, however, depends on the relative importance of interdivisional risk-sharing and relationship-specific investments.

APPENDIX

Proof of Proposition 1

First-best investments satisfy

$$\frac{\partial R(q^*,I_2^*)}{\partial I_2} - 1 = 0 \tag{a1}$$

$$-\frac{\partial C(q^*,I_1^*)}{\partial I_1} - 1 = 0. \tag{a2}$$

If investments are first best, then ICI1 and ICI2 in program P2 imply that $1/2(\alpha_i + \beta_i) = \alpha_i$ for each i. This proves the "only if" part.

Substituting $\alpha_i = \beta_i$ in ICI1 and ICI2 in program P2 yields (a1) and (a2), and thus proving the "if" part.

Proof of Proposition 2

In this case, Program P2 simplifies to

$$\underset{I_2,a_i,\alpha_i,\beta_i}{\text{Max}} \sum_{i=1}^{2} X_i(a_i) - V_i(a_i) - \frac{1}{2}\rho_i(\alpha_i{}^2\sigma_i + \beta_i{}^2\sigma_j) + R(q^*, I_2) - C(q^*) - I_2$$

subject to:

$$\alpha_i X_i'(a_i) - V_i'(a_i) = 0 \ \forall i \tag{IC}$$

$$\frac{1}{2}(\alpha_2 + \beta_2)\frac{\partial R}{\partial I_2} - \alpha_2 = 0 \tag{ICI2}$$

$$\alpha_i \geq \beta_i \ \forall i. \tag{CC}$$

Let λ_i, μ_2 denote the Lagrange multipliers on ICi and ICI2, respectively. The first-order conditions with respect to I_2, β_1, and β_2 yield

$$\left(\frac{\partial R}{\partial I_2} - 1\right) + \mu_2 \frac{\alpha_2 + \beta_2}{2} M_{22} = 0 \tag{a3}$$

$$-\rho_1\beta_1\sigma_2 \geq 0 \tag{a4}$$

$$-\rho_2\beta_2\sigma_1 + \frac{1}{2}\mu_2\left[\frac{\partial R}{\partial I_2}\right] \geq 0. \tag{a5}$$

Note that (a4) and (a5) hold with equality if the constraints CC are not binding. First note from (a4) that $\beta_1 > 0$ cannot be a solution; therefore $\beta_1 < \alpha_1$ and (a4) holds with equality, giving ii. To show i, suppose that $\beta_2 = \alpha_2$. Then ICI2 implies that $\partial R(q^*,I_2^*)/(\partial I_2) - 1 = 0$. Substituting this into (a3) implies $\mu_2 = 0$. Substituting $\mu_2 = 0$ into (a5) implies $\beta_2 \leq 0$, a contradiction. Therefore $\beta_2 < \alpha_2$ and (a5) holds with equality. This implies $\beta_2 = \mu_2 (\partial R/\partial I_2) \div 2\rho_2\sigma_1$, which is positive since it can be shown that $\mu_2 > 0$, proving i.

Proof of Proposition 3

In this case, program P2 simplifies to

$$\underset{I_2,a_i,\alpha_i,\beta_i}{\text{Max}} \sum_{i=1}^{2} X_i(a_i) - V_i(a_i) - \frac{1}{2}\rho_i\left(\alpha_i^2\sigma_i + \beta_i^2\sigma_j + \frac{1}{4}\sigma_u(\alpha_i + \beta_i)^2\right) + R(q^*, I_2) - C(q^*) - I_2$$

subject to

$$\alpha_i X_i'(a_i) - V_i'(a_i) = 0 \ \forall i \tag{IC}$$

$$\frac{1}{2}(\alpha_2 + \beta_2)\frac{\partial R}{\partial I_2} - \alpha_2 = 0 \tag{ICI2}$$

$$\alpha_i \geq \beta_i \ \forall i. \tag{CC}$$

Let λ_i, μ_2 be defined as in Proposition 2. Then first order conditions with respect to I_1, β_1, and β_2 yield

$$\left(\frac{\partial R}{\partial I_2} - 1\right) + \mu_2\frac{\alpha_2 + \beta_2}{2}M_{22} = 0 \tag{a6}$$

$$-\rho_1\left(\beta_1\sigma_2 + \frac{1}{4}(\alpha_1 + \beta_1)\sigma_u\right) \geq 0 \tag{a7}$$

$$-\rho_2\left(\beta_2\sigma_1 + \frac{1}{4}(\alpha_2 + \beta_2)\sigma_u\right) + \frac{1}{2}\mu_2\left[\frac{\partial R}{\partial I_2}\right] \geq 0. \tag{a8}$$

Note that (a7) and (a8) will hold with equality if constraints (CC) are not binding.

Since $\alpha_1 > 0$, it follows from (a7) that $\beta_1 < 0$. This proves part (ii).

To prove part (i), suppose, to the contrary, $\beta_2 = \alpha_2$. Then ICI2 implies that $\partial R(q^*,I_2^*)/(\partial I_2) - 1 = 0$. Substituting this in (a6) yields $\mu_2 = 0$. Substituting this in (a8) gives $\beta_2 < 0$ which is a contradiction. Hence, (a8) can be rearranged to yield

$$\beta_1 = \frac{-\rho_2\alpha_2\dfrac{\sigma_u}{4} + \dfrac{\mu_2}{2}\left[\dfrac{\partial R}{\partial I_2}\right]}{\rho_2\left[\sigma_1 + \dfrac{\sigma_u}{4}\right]}.$$

It can be easily verified that $\mu_2 > 0$ and, therefore, $\beta_2 > -b$ where $b \equiv \rho_2\alpha_2(\sigma_u/4)/\rho_2[\sigma_1 + (\sigma_u/4)]$.

Proof of Proposition 4

Let λ_i, μ_i denote the Lagrange multipliers on constraints IC and ICI in program P2. Then first-order conditions with respect to I_1, I_2, β_1, β_2, μ_1, and μ_2 yield

$$\left(-\frac{\partial C}{\partial I_1} - 1\right) + \mu_1 \frac{\alpha_1 + \beta_1}{2} M_{11} + \mu_2 \frac{\alpha_2 + \beta_2}{2} M_{12} = 0 \tag{a9}$$

$$\left(\frac{\partial R}{\partial I_2} - 1\right) + \mu_1 \frac{\alpha_1 + \beta_1}{2} M_{12} + \mu_2 \frac{\alpha_2 + \beta_2}{2} M_{22} = 0 \tag{a10}$$

$$-\rho_1\left(\beta_1\sigma_2 + \frac{1}{4}(\alpha_1 + \beta_1)\sigma_u\right) + \frac{1}{2}\mu_1\left[-\frac{\partial C}{\partial I_1}\right] \geq 0 \tag{a11}$$

$$-\rho_2\left(\beta_2\sigma_1 + \frac{1}{4}(\alpha_2 + \beta_2)\sigma_u\right) + \frac{1}{2}\mu_2\left[\frac{\partial R}{\partial I_2}\right] \geq 0 \tag{a12}$$

$$-\frac{1}{2}(\alpha_1 + \beta_1)\frac{\partial C}{\partial I_1} - \alpha_1 = 0 \tag{a13}$$

$$\frac{1}{2}(\alpha_2 + \beta_2)\frac{\partial R}{\partial I_2} - \alpha_2 = 0 \tag{a14}$$

where $M_{22} \equiv \frac{\partial^2 M}{\partial I_2^2} < 0$ and $M_{12} \equiv \frac{\partial^2 M}{\partial I_1 \partial I_2} > 0$.

Suppose, to the contrary, $\beta_1 = \alpha_1$ and $\beta_2 = \alpha_2$. Then, it follows from (a13) and (a14) that investments are first best. Substituting (a1) and (a2) into (a9) and (a10), we get

$$\mu_1 \frac{\alpha_1 + \beta_2}{2} M_{11} + \mu_2 \frac{\alpha_2 + \beta_2}{2} M_{12} = 0 \tag{a15}$$

$$\mu_1 \frac{\alpha_1 + \beta_1}{2} M_{12} + \mu_2 \frac{\alpha_2 + \beta_2}{2} M_{22} = 0. \tag{a16}$$

Since $M_{11}M_{22} - M_{12}^2 > 0$ by assumption, (a15) and (a16) imply that $\mu_1 = \mu_2 = 0$. However, if $\mu_1 = \mu_2 = 0$, then (a11) and (a12) imply that $\beta_1 < 0$ and $\beta_2 < 0$. Therefore, we have a contradiction. Hence it must be the case that $\beta_i < \alpha_i$ for at least one i.

Proof of Observation

Note that the *ex post* quantity choice is optimal under both cost-based and negotiated transfer pricing. Negotiated transfer pricing leads to an equal sharing of the maximized contribution margin, $R(q^*, I_2) - C(q^*, I_1) + u$. Under cost-based transfer pricing, the buyer extracts the entire surplus.

If $\gamma \in [0,1]$ denotes the fraction of maximized contribution margin that is credited to division 1, then negotiated transfer pricing corresponds to the case of $\gamma = 1/2$, whereas cost-based transfer pricing corresponds to the case of $\gamma = 0$. To prove the result, therefore, it suffices to show that the principal's expected profits are strictly decreasing in γ.

For a given γ, the principal's contacting problem is

$$\max_{I_2, a_i, \alpha_i, \beta_i} \left[\sum_{i=1}^{2} [X_i(a_i) - V_i(a_i)] + R(q^*, I_2) - C(q^*) - I_2 \right.$$
$$\left. - \frac{1}{2}\rho_1(\alpha_1{}^2\sigma_1 + \beta_1{}^2\sigma_2) - \frac{1}{2}\rho_2(\alpha_2{}^2\sigma_2 + \beta_2{}^2\sigma_1)\right]$$

Subject to

$$\alpha_i X_i'(a_i) - V_i'(a_i) = 0 \forall i \tag{IC}$$

$$[\alpha_2(1 - \gamma) + \beta_2\gamma] \frac{\partial R}{\partial I_2} - \alpha_2 = 0 \tag{ICI2}$$

$$\alpha_i \geq \beta_i \ \forall i. \tag{CC}$$

Let L denote the Lagrangian of the above maximization problem with multipliers λ_i on constraints (IC) and μ_2 on constraint (ICI2). For a given γ, let Π (γ) denote the value of the principal's objective function evaluated at the optimal choices of investment, efforts, and bonus coefficients. Then, the Envelope Theorem implies that

$$\frac{d\Pi}{d\gamma} = \frac{\partial L}{\partial \gamma}$$
$$= -\mu_2(\alpha_2 - \beta_2) \frac{\partial R}{\partial I_2}.$$

It can be easily verified that $\alpha_2 > \beta_2$, $\mu_2 > 0$ if $\gamma > 0$ and $\beta_2 = \mu_2 = 0$ if $\gamma = 0$. Hence principal's expected profits are decreasing in γ.

REFERENCES

Amershi, A., and P. Cheng. 1990. Intrafirm resource allocation: The economies of transfer pricing and cost allocation in accounting. *Contemporary Accounting Research* 7 (Fall): 61–99.

Antle, R., and G. Eppen. 1985. Capital rationing and organizational slack in capital budgeting. *Management Science* 31 (February): 163–174.

Baiman, S., and M. Rajan. 1995. Centralization, delegation, and shared responsibility in the assignment of capital investment decision rights. *Journal of Accounting Research* 33 (Supplement): 135–164.

Baldenius, T. 1998. Intrafirm trade, bargaining power, and specific investments. Working paper, University of Vienna.

Bushman, R., R. Indjejikian, and A. Smith. 1995. Aggregate performance measures in business unit manager compensation: The role of intrafirm interdependencies. *Journal of Accounting Research* 33 (Supplement): 101–128.

Christensen, J., and J. Demski. 1996. Transfer pricing in a limited communication setting. Working paper, University of Florida.

Darrough M., and N. Melumad. 1995. Divisional versus company-wide focus: The trade-off between allocation of managerial attention and screening of talent. *Journal of Accounting Research* 33 (Supplement): 65–94.

Edlin, A., and S. Reichelstein. 1995. Specific investment under negotiated transfer pricing: An efficiency result. *The Accounting Review* 70 (April): 275–291.

Feltham, G., and J. Xie. 1994. Performance measure congruity and diversity in multi-task principal/agent relations. *The Accounting Review* 69 (July): 429–453.

Grossman, S., and O. Hart. 1986. The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy* 94 (August): 691–719.

Harris, M., C. Kriebel, and A. Raviv. 1982. Asymmetric information, incentives, and intrafirm resource allocation. *Management Science* 28 (June): 604–620.

Hart, O. 1995. *Firms, Contracts, and Financial Structure*. Oxford, U.K.: Claredon Press.

Holmstrom, B., and P. Milgrom. 1987. Aggregation and linearity in the provision of intertemporal incentives. *Econometrica* 55 (March): 303–328.

———, and J. Tirole. 1991. Transfer pricing and organizational form. *Journal of Law, Economics and Organization* 7: 201–228.

Melumad, N., D. Mookherjee, and S. Reichelstein. 1997. Contract complexity, incentives and the value of delegation. *Journal of Economics and Management Strategy* 6 (Summer): 257–289.

Sahay, S. 1997. Studies in the theory of transfer pricing. Ph.D. dissertation, University of California at Berkeley.

Vaysman, I. 1996. A model of cost-based transfer pricing. *Review of Accounting Studies* 1 (March): 73–108.

Williamson, O. 1985. *The Economic Institutions of Capitalism.* New York, N.Y.: Free Press.

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The Relationship Between Economic Characteristics and Alternative Annual Earnings Persistence Measures

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ABSTRACT: Accounting researchers (and potentially others) generally select rather simple, lower-order, time-series models to develop proxies for earnings persistence. However, measures of persistence produced by such models are not related to characteristics of the firm's economic environment that are expected to influence earnings persistence. Using a sample of 162 calendar year-end New York Stock Exchange firms, we document the cross-sectional relations between a set of relatively constant, firm-specific, economic characteristics that are theoretical determinants of persistence and measures of earnings persistence derived from both lower-order and higher-order Autoregressive, Integrated, Moving-Average (ARIMA) models. When lower-order ARIMA models are used to generate measures of earnings persistence, the cross-sectional regression models measuring the association between persistence and economic determinants of persistence yield very low adjusted R^2s. In sharp contrast, when differenced, higher-order ARIMA models are used to measure earnings persistence, adjusted R^2s are in the 10–12 percent range. Moreover, independent variables such as capital intensity, barriers-to-entry, and product-type are all significant in the directions suggested by economic theory. Our results are consistent with Lipe and Kormendi (1994) who argue

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that higher-order ARIMA models do a better job of capturing the value-relevance of current period earnings than lower-order models.

Key Words: *Earnings persistence, ARIMA models, Barriers-to-entry, Capital Intensity, Durable goods.*

Data Availability: *All data are publicly available.*

I. INTRODUCTION

Economic theory identifies a set of relatively constant, firm-specific characteristics that cause earnings to behave in a persistent fashion. The levels of these often-cited characteristics—barriers-to-entry, capital intensity, firm size and product-type—yield an expectation in the minds of analysts, researchers, investors and managers of how persistent current earnings are in the intermediate to long run. If statistical analysis of the past time series of earnings is used as a gauge of the strength of the link between current and future earnings, then one criterion for the choice of a specific time-series model is its ability to quantify the joint effects of these economic factors on earnings persistence. Although it is clear that accounting researchers use time-series models to obtain measures of earnings persistence (e.g., Lev 1983; Collins and Kothari 1989; Easton and Zmijewski 1989), evidence empirically linking economic characteristics to time-series persistence measures is scarce (Lipe 1990), and evidence of the extent to which persistence measures derived from alternative time-series models differentially associate with economic characteristics of firms is nonexistent.

Further, although the extent to which analysts, managers and investors use time-series models to form earnings expectations remains an open question, knowledge of the ability of alternative time-series models to quantify earnings persistence would seem to be an important criterion in choosing a particular time-series model in a valuation context. Of course, the importance of our research to these parties hinges on whether they use time-series models or, in order to improve their decision process, whether they should consider time-series model use. For example, Bernard and Thomas (1990) and Brown and Han (1996) identify systematic and predictable components of forecast errors that are consistent with investors' failure to consider the time-series properties of earnings.

We combine estimated parameters from the (1,0,0) Auto-regressive, Integrated, Moving-Average (ARIMA) model examined by Easton and Zmijewski (1989), the (0,1,1) ARIMA model employed by Collins and Kothari (1989), and two higher-order autoregressive processes (e.g., the (2,1,0) and (4, 1,0) ARIMA models) examined by Lipe and Kormendi (1994) with valuation theory to generate measures of earnings persistence.[1] By employing a wide set of ARIMA structures based upon divergent time-series properties, we can assess how well competing representations of the time-series properties of annual earnings capture the set of specific economic characteristics of the examined firms.[2] Our primary finding is that persistence measures derived from the higher-order ARIMA models exhibit a far higher association with the set of economic determinants of persistence than persistence measures derived from lower-order ARIMA models.

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[1] We employ the conventional notation where (p) represents the order of the regular autoregressive parameters, (d) represents the level of consecutive differencing, and (q) represents the order of the regular moving-average parameters. For example, the (1,0,0) ARIMA model has a first-order autoregressive parameter and the (0,1,1) model employs consecutive differencing and a first-order moving-average parameter.

[2] Additionally, we provide test results on the (4,0,0) higher-order ARIMA model. This enables us to compare directly a higher-order ARIMA model (4,0,0) vs. a lower-order model (1,0,0) in a setting where differencing is held constant.

Our inquiry is related to that of Lev (1983). He examined the cross-sectional relation between a set of economic characteristics and the first and second order autocorrelation coefficients of earnings changes, return on equity changes, and sales changes. Lev's (1983) objective was to see if characteristics of the studied time series were related to the firm's economic environment. His finding that there are associations between characteristics of the firm's economic environment and the first two autocorrelation coefficients in earnings changes can be viewed as consistent with our result that a persistence measure from a higher-order (2,1,0) ARIMA model of earnings is associated with the characteristics of the firm's economic environment. However, our primary interest is in the extent to which alternative ARIMA models capture the persistence implied by a set of economic characteristics. Our findings are that measures of persistence from relatively higher-order ARIMA models are related to the characteristics of the firm's economic environment, but that measures of persistence from relatively lower-order ARIMA models are not significantly related to the characteristics of the firm's economic environment. An implication of our findings is that persistence measures from relatively simple lower-order ARIMA models are likely to contain a degree of error that makes them unsuitable for use in the empirical contexts in which they have been employed. For example, Collins and Kothari (1989) obtain a persistence measure from a (0,1,1) ARIMA model and find that the significance of this measure in explaining earnings response coefficients is dependent upon whether earnings changes are scaled by price or the prior period's earnings. Collins and Kothari (1989, 173) explain that the inconsistent performance of their persistence measure in explaining earnings response coefficients results from an inability to separate the effects of persistence from the effects of growth. Our results suggest another explanation is that a persistence measure from a lower-order ARIMA process does not reflect the economic characteristics that give rise to earnings persistence.

The remainder of the paper is organized as follows. Section II provides an economic analysis of earnings behavior. Section III provides a background on the time-series properties of earnings and earnings persistence factors. Section IV describes our sample selection procedures and earnings persistence measures. Section V identifies our independent variables and describes the empirical proxies we employ. Section VI provides descriptive statistics pertaining to the research design variables. Section VII presents the cross-sectional regression results, while section VIII provides additional analyses. Concluding remarks are contained in section IX.

II. ECONOMIC DETERMINANTS OF EARNINGS PERSISTENCE

In order to gain a competitive advantage, firms engage in strategic investment and operating decisions. These decisions create conditions in which current earnings and earnings increases are sustained. In assessing the success of these strategic decisions, analysts and investors look for observable traits that are expected to yield profits that persist. The economics and strategic management literatures regularly identify four such observable traits: firm size, product-type, barriers-to-entry, and capital intensity.[3]

Scherer (1973) provides evidence that the variability in growth rates of larger firms is lower than that experienced by small firms. Large firms have the financial resources to diversify with the expectation that doing so will stabilize growth and lead to a more persistent earnings stream. Also, Martin (1988) provides additional evidence that large firms can offset transitory earnings decreases by imposing price increases, and thus, generate more persistent earnings streams than small firms. These factors serve to increase the autocorrelations of earnings levels. Empirical evidence on the association of firm size and earnings autocorrelation, however, is mixed. Bathke et al. (1989) find a positive association for quarterly earnings, while Lev (1983) finds no such association for annual earnings.

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[3] The strong support for these observable traits in the economics literature leads Lev (1983) to select the same set of variables for his study.

The effect of demand for durable vs. nondurable goods on persistence is traced to Friedman (1957) who partitions income into permanent and transitory components. He suggests that the former is related to the consumption of nondurable goods and services while the latter is more related to spending patterns on durable goods. Evidence in Darby (1972), Zarnowitz (1972) and Caves (1987) supports Friedman's (1957) view that permanent (transitory) income is related to the consumption of nondurable (durable) goods and services. The more volatile patterns of demand experienced by durable goods producers lead to less sustainable earnings surprises relative to nondurable goods producers.

As suggested by Stigler (1963), Mueller (1977) and Kamerschen (1968), higher barriers-to-entry decrease competition by limiting entry into an industry. Decreased competition leads to market share stability, and the market power enjoyed by firms that have created such barriers enables sustainable earnings growth. Empirically observable elements of barriers-to-entry are product differentiation as implied by advertising intensity and product innovation as implied by research and development intensity (Connolly and Hirschey 1984). Higher levels of advertising and research and development intensity yield an expectation of higher levels of earnings persistence.

Eaton and Lipsey (1981) support a positive link between industry profitability and capital intensity suggesting capital intensity's potential as another source of barriers-to-entry. However, a cursory examination of Palmer's (1973) classification of industries into barriers-to-entry groups based on multiple criteria indicates a substantial presence of capital-intensive industries in the low barriers-to-entry group. For example, the low-barriers group includes mining, construction, meatpacking, textiles, paint, building materials, auto parts, and hotels. Scherer (1973) and Lev (1983) argue that the relatively high earnings volatility of capital-intensive firms is due to operating leverage reflected by the proportion of fixed cost to total cost. The relatively high earnings volatility of capital-intensive firms will tend to disrupt earnings autocorrelations relative to the smoother earnings series of low capital-intensive firms. Consistent with the notion that capital intensity is theoretically related to persistence in costs included in the earnings series, Lev (1983) finds a strong negative relation between capital intensity and the sample autocorrelations of earnings.

These economic factors—firm size, product-type, barriers-to-entry and capital intensity—jointly determine the persistence of earnings. At issue is whether persistence estimated from the earnings time series derived from applying generally accepted accounting principles captures the joint effects of these economic factors, and for the specific purpose of this study, whether differenced, higher-order ARIMA model measures of persistence do so to a greater extent.

III. TIME-SERIES PROPERTIES OF EARNINGS AND EARNINGS PERSISTENCE

We fit alternative ARIMA models to the annual earnings series of the firms in our sample and use estimated ARIMA parameter values to obtain alternative measures of earnings persistence.[4] This approach allows us to associate directly the long-run economic characteristics of firms with proxies for earnings persistence that parsimoniously capture the effect of a current earnings innovation upon the whole stream of future realizations of the earnings series. In this context, Lipe and Kormendi (1994) demonstrate that actual persistence measures derived from lower-order ARIMA models do not capture all the value-relevant time-series properties of actual earnings because lower-order models ignore a number of negative autocorrelations at higher lags that, although small individually, are significant when considered in the aggregate. Much of the prior literature that provides measures for earnings persistence restricts the analysis to such lower-order models without assessing the sensitivity of results to alternative ARIMA specifications.[5] A major contribution of our study is the use of both lower-order and higher-order ARIMA models to derive measures of earnings persistence.

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[4] This approach has a rich tradition in the accounting literature. See, for example, Kormendi and Lipe (1987), Collins and Kothari (1989), Lipe (1990) and Lipe and Kormendi (1994).

The accounting literature pertaining to earnings persistence has confined ARIMA-based proxies to uniform ARIMA model structures instead of firm-specific models. Moreover, previous work has emphasized lower-order ARIMA models (i.e., (0,1,1) and (1,0,0)) vs. the higher-order models that we examine in the current paper (i.e., (2,1,0) and (4,1,0)). Brown (1993) reviews the time-series literature in earnings forecasting where uniform ARIMA model structures consistently outperform firm-specific alternatives in predictive ability. Foster (1977) has attributed the dominance of uniform model structures to their relatively parsimonious nature, which may make them less susceptible to structural change. Note that such uniform structures still permit firm-specific parameter estimation. The dominance of uniform model structures vs. firm-specific alternatives has been robust across such diverse objects of prediction as annual earnings, quarterly earnings, and most recently, quarterly cash flows (Lorek and Willinger 1996). For the above reasons, we examine uniform ARIMA model structures (both lower- and higher-order) and do not employ firm-specific models.

Other studies that have developed non-time-series-based proxies for earnings persistence typically focus only upon the subsequent earnings realization. For example, Easton and Zmijewski (1989) measure earnings persistence by regressing revisions of one-quarter-ahead analyst earnings forecasts on the most recently realized analyst forecast errors. This proxy only captures the short-term implications of the current innovation to the earnings series and ignores potentially relevant mean-reverting characteristics identified by Lipe and Kormendi (1994). Penman (1992) employs the Pr measure from Ou and Penman (1989a, 1989b) as a proxy for earnings persistence. Pr makes predictions about the likely direction of the changes in earnings from year 0 to year +1 and varies from one period to the next based on changes in the financial statement data that underlie the Pr calculation. Similarly, Lev and Thiagarajan (1993) develop an "aggregate fundamental score" derived from financial statement information subject to significant changes from period to period. Such intertemporal variation conflicts with our view of persistence as a firm-specific constant or as a slowly changing value.[6] In this regard, Penman (1992, 577) acknowledges that the Pr measure "is based on one-year-ahead earnings changes only, and earnings persistence refers to earnings over a longer horizon."

Our ARIMA-based approach to measuring earnings persistence allows us to apply valuation theory to determine the effect on expected future earnings of a "generic" $1 innovation in the current period. Alternative approaches to persistence measurement based on period-specific variables do not afford this opportunity. Both fundamental analysis employing period-specific ratios and longer-run analysis of industrial structure and firm strategy are critical to firm valuation and credit analysis.[7] Our study examines the link between longer-run economic variables related to structure and strategy and longer-run assessments of earnings persistence.

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[5] Exceptions include Kendall and Zarowin (1990), Lipe and Kormendi (1994) and Ramesh (1990).

[6] ARIMA-based measures derived from a long time series of earnings will change very slowly as the earnings generating process evolves.

IV. SAMPLE SELECTION AND MEASURES OF PERSISTENCE

Sample and Models

We analyze a sample of 162 calendar year-end New York Stock Exchange firms with complete time-series data for annual net income before extraordinary items from 1967 through 1990 on the annual Compustat tape. We also require complete data for the measurement of the economic characteristics (described later). Time-series analysis of annual earnings suffers from the requirement of relatively long series. To the extent that our surviving sample has characteristics that differ from firms that are not in our sample, generalizability is impaired.

Although statistical conditions (i.e., stationarity and invertibility requirements) in the ARIMA model estimation suggest that parameter estimates are not severely affected by structural changes, we *assume* stability in model-building.[8] Our sample firms, like the firms that do not enter our sample, have unstable characteristics. This instability condition causes noise in the ARIMA parameter estimation (though as noted above, not severe).

Annual Earnings Persistence Factors

The persistence (PER) of an earnings series captures how a current shock is expected to affect the whole stream of future realizations of the earnings series. Collins and Kothari (1989, 148) adapt Flavin's (1981) approach to show that, for a given ARIMA (p, d, q) model specification, persistence is a function of the autoregressive and moving-average parameters as follows:

$$\mathrm{PER} = \frac{1 - \sum_{i=1}^{q} B^i \theta_i}{(1 - B)^d \left(1 - \sum_{j=1}^{p} B^j \varphi_j\right)} - 1 \qquad (1)$$

where:

$B = 1/(1 + r)$ where r is the appropriate rate for discounting expected future earnings.[9]
θ_i = moving-average parameter of order i.
d = level of consecutive differencing.
φ_j = autoregressive parameter of order j.

Our measures of earnings persistence are based on alternative assumptions on the ARIMA (p, d, q) structure for annual earnings. Our first two measures are based on lower-order ARIMA specifications such as the simple autoregressive structure (1,0,0) used by

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[7] See Palepu et al. (1997) and Stickney (1996).

[8] See McCleary and Hay (1980, 57–64) for a discussion on the specific parameter boundaries that satisfy the stationarity and invertibility requirements.

[9] Consistent with prior work, we set r = .10. All results are qualitatively similar with r = .04 and .20.

Easton and Zmijewski (1989) and the integrated moving-average structure (0,1,1) used by Collins and Kothari (1989).[10] If persistence is measured properly by lower-order, parsimonious ARIMA models, then these simple ARIMA specifications should provide high correlations with economic determinants of persistence. However, Lipe and Kormendi (1994) provide evidence that the earnings series may exhibit systematic higher-order properties consistent with mean reversion. Since all autocorrelations affect persistence, it is possible that a large number of small, higher-order autocorrelations may offset, at least partially, a few larger, lower-order autocorrelations. Since the two aforementioned ARIMA structures contain only first-order parameters, they do not capture the effects of higher-order autocorrelations. Therefore, we use the (2,1,0) and (4,1,0) autoregressive processes to assess such higher-order effects on earnings persistence measurement.[11] If the earnings-generating process exhibits higher-order, time-series properties, then persistence measurement should improve with higher-order ARIMA models. On the other hand, estimation errors in the higher-order autoregressive parameters may result in more accurate earnings persistence measures for the more parsimonious, lower-order models.

We did not explicitly screen to detect firms that had substantial changes in their earnings time series. However, implicit checks for such structural changes are the stationarity and invertibility requirements associated with ARIMA parameter estimation. All estimated parameters of our ARIMA-based models that involve differencing fulfill these conditions which mitigate the potential of structural changes having a major impact on the time series of interest.

V. INDEPENDENT VARIABLE MEASUREMENT

Empirical tests of the relation between economic characteristics and alternative measures of persistence require proxies for firm size, product-type, barriers-to-entry, and capital intensity. We use long-run averages for the independent variables because we empirically relate them to persistence, which is a long-run phenomenon. Further, period-specific measurement of independent variables would likely be affected by general economic conditions in a given year and a company's current cash flow position, and thus, would be unlikely to capture the general tendency, for example, to create barriers-to-entry through creation of brand name or product innovation.

Firm Size (SIZE)

Our proxy for firm size is the average of the logs of market value of common equity measured over the entire sample period (i.e., the average of 24 logs from 1967 to 1990):

$$\text{SIZE} = \sum_{i=1}^{24} \log\,(\text{market value of equity}_i)/24. \tag{2}$$

Product-Type (DUR)

We assigned firms to durable or nondurable industry groupings by comparing firms' Compustat industry membership codes (i.e., DNUMS) with the descriptions of the industry groupings contained in the *Survey of Current Business*. Biddle and Seow (1991) use a similar grouping procedure. We define a one (zero) indicator variable, DUR, for durable (nondurable) goods. Since durable goods producers are coded with a value of one, and we expect lower levels of earnings persistence for these firms, we expect a negative relation between DUR and persistence.[12]

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[10] The lower order of the model does not imply short-term estimation. Persistence is a long-run phenomenon, and thus, is estimated over the long term.

[11] Differencing is required for earnings due to nonstationarity. The (4,0,0) ARIMA model is also tested to make direct comparisons with the (1,0,0) ARIMA model with differencing held constant. However, these models are nonstationary.

Barriers-to-Entry (BTE)

Rumelt (1991) states that current work in industrial economics typically employs industry-level proxies for BTE, while the strategic management literature has employed BTE sub-elements measurable on a firm-specific basis. We employ firm-specific measurement for two reasons. First, our persistence factors are measured on a firm-specific basis. Second, available industry-level proxies for BTE (see Palmer 1973) combine three sub-elements of BTE that have been identified as having counterbalancing effects on persistence. Two sub-elements of BTE, product differentiation (e.g., advertising) and product innovation (e.g., research and development) have expected positive effects on persistence. As we argued earlier, the third sub-element of BTE when measured at the industry level by Palmer (1973), capital intensity, is expected to have a negative effect on persistence. By disaggregating the sub-elements of BTE, potential counterbalancing of capital intensity effects vis-à-vis advertising and research and development effects is avoided.

Since they have the same expected positive relation with persistence, we combine advertising and research and development and measure them on a firm-specific basis. Consistent with Connolly and Hirschey (1984), we computed the intertemporal average of 24 yearly ratios formed by adding research and development expense to advertising expense in the numerator divided by sales revenue in the denominator over the 1967 to 1990 period.[13] We do not include capital intensity as an element of BTE, consistent with arguments in the strategic management literature, Scherer's (1973) theoretical arguments noted in section II, and Lev's (1983) results supporting a strong negative association of capital intensity and autocorrelations.

As a supplemental test, we classified barriers-to-entry as high, substantial, low (i.e., a 3, 2, 1 indicator variable) using the industry classification scheme devised by Palmer (1973), and employed by Lev (1983) and Baginski et al. (1993). Palmer's (1973) index is measured at the industry level and includes the following potentially counterbalancing BTE sub-elements: (1) scale barriers pertaining to cost curve behaviors for large outputs, (2) product differentiation barriers via advertising procedures, (3) absolute cost barriers pertaining to patents and natural resources, and (4) capital barriers.

Capital Intensity (CAP)

We measured capital intensity on a firm-specific basis as the average of 24 yearly ratios formed by summing depreciation, depletion, and amortization expense in the numerator and dividing by sales revenue in the denominator over the 1967 to 1990 period. This approach is similar to Lev's (1983) definition of capital intensity as a ratio of fixed capital charges to sales.

VI. DESCRIPTIVE STATISTICS

Table 1 provides descriptive statistics for our sample of 162 firms. Panel A contains descriptive statistics for the earnings persistence measures (PER) for each of the five

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[12] The sample was comprised of 162 firms that remained consistently categorized as durable or nondurable throughout the entire test period: 1967–1990. Seven firms which changed DNUMS and industry groupings during this time interval were deleted from the sample.

[13] The method of averaging is equivalent to that which we show for firm size in equation (2).

TABLE 1
Descriptive Statistics for Dependent and Independent Variables
(n = 162)

Panel A: Dependent Variable—Persistence (PER)[a]

ARIMA Model	*Mean*	*Standard Deviation*	*Tenth Percentile*	*Median*	*Ninetieth Percentile*
(1,0,0)	1.98	2.17	0.00	1.00	5.02
(4,0,0)	3.08	2.50	0.13	2.52	6.52
(0,1,1)	6.93	4.39	1.73	6.43	13.45
(2,1,0)	9.49	10.64	4.34	6.50	15.91
(4,1,0)	10.06	13.93	2.80	5.69	20.77

Panel B: Independent Variables—Continuous

Variable	*Mean*	*Standard Deviation*	*Tenth Percentile*	*Median*	*Ninetieth Percentile*
Firm Size (SIZE)[b]	6.30	1.52	4.37	6.28	8.26
Barriers-to-Entry (BTE)[c]	.02	.03	0.00	.01	.05
Capital Intensity (CAP)[d]	.05	.04	.02	.04	.09

Panel C: Independent Variables—Categorical

Variable	*Category*	*Value*	*Observations*
Product-type (DUR)[e]	Durables	1	61
	Nondurables	0	101

Panel D: Means and Medians of Continuous Variables for the Durable and Nondurable Firms

	Durables (n = 61)		*Nondurables (n = 101)*	
Variable	*Mean*	*Median*	*Mean*	*Median*
SIZE	6.30	6.23	6.29	6.33
BTE	.03	.02	.02	.01
CAP	.04	.03	.06	.05

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[a] PER = persistence in annual earnings using firm-specific parameter estimates of (1,0,0), (0,1,1), (2,1,0), (4,1,0), and (4,0,0) ARIMA models. The formula for PER is:

$$\text{PER} = \frac{1 - \sum_{i=1}^{q} B^i\theta_i}{(1 - B)^d \left(1 - \sum_{j=1}^{p} B^j\varphi_j\right)} - 1$$

(*Continued on next page*)

TABLE 1 (Continued)

where:

$B = 1/(1 + r)$ where r is the appropriate rate for discounting expected earnings ($r = .10$ for this table).
θ_i = moving-average parameter of order i.
d = level of consecutive differencing.
φ_j = autoregressive parameter of order j.

[b] SIZE = average of the logs of market value of equity over the 1967–1990 period.
[c] BTE = average values of research and development expense and advertising expense over the 1967–1990 period, deflated by average sales over the same period.
[d] CAP = average values of depreciation, depletion, and amortization expense over the 1967–1990 period, deflated by average sales over the same period.
[e] DUR = classification obtained from *Survey of Current Business.*

ARIMA models. All persistence measures are computed using a discount rate of 10 percent. We concentrate on the median persistence measures because the means and standard deviations are influenced by outlier values. Note that for the differenced models, ninetieth percentile values are very large and are substantially farther from the median than tenth percentile values.

The earnings persistence measure for the (4,1,0) ARIMA model (median persistence 5.69) is smaller than the measure of persistence for the (2,1,0) ARIMA model (median persistence 6.50). This reduction in median persistence can be attributed to the third- and fourth-order autoregressive parameters in the (4,1,0) ARIMA model, which, according to Lipe and Kormedi (1994), capture the negative autocorrelations of earnings at higher lags relative to the (2,1,0) ARIMA model. However, the smaller persistence is not simply a function of the order of the ARIMA model because the undifferenced, higher-order (4,0,0) ARIMA model has a median persistence of 2.52 compared to the corresponding median value of 1.00 for the undifferenced, lower-order (1,0,0) ARIMA model.[14]

Panels B and C present similar descriptive statistics for the independent variables. The only independent variable transformation is the log transformation of firm size. Panel D provides mean and median values for SIZE, BTE and CAP for the product-type subsample, durables ($n = 61$) and nondurables ($n = 101$).

Table 2 presents univariate Spearman rank order correlations between all continuous variables. Two observations are noteworthy. First, as expected, the correlations between annual earnings, ARIMA-based persistence measures are relatively high (.47 to .85) and all significant ($p < .001$). Second, the continuous independent variables: size, barriers-to-entry, and capital intensity are all associated with each other ($p < .001$ to $p < .087$). The independent variables are hypothesized to jointly determine persistence, their hypothesized effects on persistence are not all in the same direction, and they are not orthogonal effects. Therefore, we estimate multivariate relations using regression analysis.

VII. REGRESSION RESULTS

We estimated the following cross-sectional relation between the set of economic characteristics and alternative earnings persistence measures:

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[14] Recall that the (4,0,0) ARIMA model is included to ascertain the effects of order vs. differencing on the results. Lipe and Kormendi (1994) use differencing in the higher-order models that they provide to capture higher-order mean reversion tendencies in earnings.

TABLE 2
Spearman Rank Order Correlations Among Continuous Variables
(n = 162; p-values in parentheses)

	Persistence Measures					*Independent Variables*		
	(1,0,0)	*(0,1,1)*	*(2,1,0)*	*(4,1,0)*	*(4,0,0)*	*SIZE*	*BTE*	*CAP*
PER (1,0,0)	—	.81 (.001)	.76 (.001)	.79 (.001)	.77 (.001)	−.06 (.418)	−.07 (.379)	−.05 (.504)
PER (0,1,1)		—	.85 (.001)	.71 (.001)	.51 (.001)	−.03 (.732)	−.04 (.652)	−.08 (.323)
PER (2,1,0)			—	.76 (.001)	.47 (.001)	−.04 (.657)	−.07 (.385)	−.12 (.143)
PER (4,1,0)				—	.62 (.001)	−.05 (.526)	.00 (.965)	−.14 (.066)
PER (4,0,0)					—	−.08 (.311)	−.12 (.140)	−.05 (.515)
SIZE						—	.35 (.001)	.13 (.087)
BTE							—	−.35 (.001)
CAP								—

All variables are defined in table 1.

$$PER = B_0 + B_1SIZE_i + B_2DUR_i + B_3BTE_i + B_4CAP_i + e_i \qquad i = 1,\ldots,162 \qquad (3)$$

where:

PER = persistence of annual earnings derived from equation (1) using the following ARIMA models: (1) (1,0,0); (2) (0,1,1); (3) (2,1,0); (4) (4,1,0); (5) (4,0,0).
$SIZE_i$ = the log of market value of equity.
DUR_i = durable (1) or nondurable (0) goods producer.
BTE_i = barriers-to-entry.
CAP_i = capital intensity.
B_i = coefficients estimated using ordinary least squares regression in the cross-section.

Table 3 presents the estimates of equation (3) for the earnings persistence measures derived from equation (1) for the ARIMA models.[15] The first two columns report results

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[15] The dependent variable is winsorized at two standard deviations from the mean. Winsorization served to mitigate the effects of outliers on the estimation. All regressions have been (1) checked for outliers, (2) run with unwinsorized data, (3) run with influential observations deleted, and (4) run with the dependent variables redefined as the value minus its sample mean and divided by its sample standard deviation to standardize dependent variables across regressions. The (4,1,0) and (2,1,0) ARIMA models continue to dominate lower-order models in a manner consistent with that reported in the tables and text.

TABLE 3
Association of Earnings Persistence Measures (PER) and Selected Economic Characteristics (1967–1990; n = 162)

Model: $PER = B_0 + B_1\, SIZE_i + B_2\, DUR_i + B_3\, BTE_i + B_4\, CAP_i + e_i \quad i = 1,\ldots,162$

		Coefficient Estimates (t-statistics in parentheses)				
		PER Computed Using ARIMA Models				
Variable	*Expected Sign*	*(1,0,0)*	*(0,1,1)*	*(2,1,0)*	*(4,1,0)*	*(4,0,0)*
Intercept		2.70	8.06	10.43	13.62	4.28
		(3.62)**	(5.12)**	(4.59)**	(4.08)**	(4.61)**
SIZE	+	−0.09	−0.07	0.21	0.15	−0.10
		(−.77)	(−.28)	(0.59)	(0.30)	(−.73)
DUR	−	−0.73	−0.99	−3.65	−5.81	−0.89
		(−2.18)*	(−1.40)	(−3.59)**	(−3.89)**	(−2.15)*
BTE	+	13.06	20.94	39.84	58.92	1.39
		(1.75)*	(1.33)	(1.75)*	(1.77)*	(.15)
CAP	−	−4.41	−17.31	−52.46	−93.03	−5.34
		(−.71)	(−1.33)	(−2.78)**	(−3.36)**	(−.69)
Adjusted R^2		.021	.009	.103	.125	.008
F-statistic		1.85	1.37	5.61**	6.75**	1.32

*,** Significant at the .05 and .01 level in a one-tailed test (two-tailed for intercept), respectively.
All variables are defined in table 1.

for the persistence measures derived from lower-order ARIMA models: (1,0,0) and (0,1,1), respectively. These models are characterized by low adjusted R^2s (.021 and .009) and insignificant F-statistics (1.85 and 1.37) indicating virtually no explanatory power. In general, these results suggest that there is no relationship between earnings persistence and the set of economic characteristics when lower-order ARIMA models are employed to measure persistence.

The next two columns in table 3 report results based on earnings persistence measures derived from higher-order ARIMA models: (2,1,0) and (4,1,0), respectively. The results stand in sharp contrast to those that we reported for the lower-order ARIMA models. The higher-order models are characterized by substantially greater adjusted R^2s (.103 and .125) and significant F-statistics (5.61 and 6.75). In both models, product-type (DUR), barriers-to-entry (BTE) and capital intensity (CAP) are significant in the hypothesized directions. The model with the greatest explanatory power is the (4,1,0) ARIMA structure. This model is particularly important because the earnings persistence measure derived from it captures mean reversion of earnings through time.

The last column in table 3 provides results pertaining to a similar regression using the (4,0,0) ARIMA model. The (4,0,0) ARIMA model is characterized by low adjusted R^2 (.008) and insignificant F-statistic (1.32). Thus, consistent with Lipe and Kormendi (1994), earnings persistence derived from differenced, higher-order models yields the highest association with economic determinants of persistence.

VIII. ADDITIONAL TESTS

We performed additional tests (not reported in tables) to ascertain the sensitivity of our findings to alternative specifications of the independent variables in equation (3). Specifically, we replaced the log of the market value of equity with the log of sales as the firm-size proxy, and the continuous barriers-to-entry variable with an ordinal (high = 3, substantial = 2, and low = 1) variable derived from Palmer's (1973) classification scheme. Lev (1983) used the log of sales as his size proxy and Palmer's (1973) ordinal variable as his BTE proxy. We reran equation (3) with the above changes for each of the four ARIMA models.

The overall tenor of these supplementary tests is supportive of our main findings. Specifically, the supplemental tests resulted in very low explanatory power for the regressions using the lower-order ARIMA models (adjusted R^2s = .028 for the (1,0,0) ARIMA model and .008 for the (0,1,1) ARIMA model). In contrast, the regressions using the higher-order ARIMA models performed considerably better (adjusted R^2s = .074 for the (2,1,0) ARIMA model and .106 for the (4,1,0) ARIMA model). While the pattern of dominance of the higher-order ARIMA models is apparent in the supplemental tests, nevertheless, our primary test results for the higher-order ARIMA models in table 3 exhibit higher adjusted R^2s (.103 and .125, respectively).

We also performed supplemental tests for redefinitions of the dependent variable. First, we measured earnings persistence as the fourth-order scaled variance used by Lipe and Kormendi (1994). This measure avoids specification of the (p, d, q) structure for earnings, and thus, represents a highly simplified measure of earnings persistence that is not derived within a discounted earnings framework, but that does capture higher-order time-series properties to some extent. Lipe and Kormendi (1994, 31) define the estimated kth ordinate of the scaled variogram as:

$$R(k) = \frac{\sigma^2(k)}{k\sigma^2(1)} \frac{n-1}{n-k} \tag{4}$$

where, n = sample size, k = lag, and σ^2 =variance of the differenced annual earnings series at the kth lag. The fourth-order scaled variance is measured by setting k equal to four.

Correlations between R(k) and the ARIMA-based earnings persistence measures, while significant ($p < .001$), were somewhat lower (.43 to .58) than what we obtained among ARIMA-based earnings persistence measures. Replication of the regression tests with R(k) as the dependent variable yielded an adjusted R^2 of .049, higher than the lower-order ARIMA models, but less than half of the adjusted R^2s for the higher-order ARIMA models.

Second, we repeated our regression tests using sales persistence measured by the alternative ARIMA models as the dependent variable. Accounting rule changes and earnings management (both related most often to the expense series) may interfere with the expected relation between measures of earnings persistence and economic characteristics. Examining the relation between sales persistence measures and economic characteristics will provide some insight about the degree of this interference.[16]

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[16] Several accounting rule changes occurred during our sample period. To the extent that persistence is affected by changes in accounting rules, noise is introduced into the estimation of the ARIMA parameters, and the R^2s for all models should decline. Since we hold estimation period (the number and nature of accounting rule changes) and firm (the effects of the changes on persistence) constant in our comparisons, it is unlikely that

The correlations between ARIMA-based earnings and sales persistence measures were substantially lower (.03 to .45) but significant ($p < .001$), with the exception of correlations between any earnings persistence measure and sales persistence obtained from the (4,0,0) ARIMA model (all correlations insignificant). The model based on sales persistence derived from the (1,0,0) ARIMA model had a low adjusted R^2 (.012) and an insignificant F-statistic (1.49). When sales persistence was derived from the (0,1,1) ARIMA process, the model had a relatively higher adjusted R^2 (.035) and a significant F-statistic (2.48). However, consistent with our findings for earnings persistence, models based on sales persistence measures derived from the higher-order ARIMA structures had substantially greater adjusted R^2s (.104 and .084) and significant F-statistics (5.68 and 4.68). It does not appear that noise introduced by accounting measurement techniques and earnings management affects the conclusion that higher-order ARIMA models generate persistence measures that exhibit higher correlation with economic determinants of persistence.[17]

IX. CONCLUDING REMARKS

We document the relations between a set of firm-specific, economic characteristics and earnings persistence measures derived from both lower-order and higher-order ARIMA models. Our results indicate that conclusions about persistence measures are conditional upon ARIMA model specification. We find that earnings persistence measures derived from lower-order ARIMA models ((1,0,0) and (0,1,1)) are less associated with firm-specific economic characteristics than persistence measures derived from differenced, higher-order ARIMA models ((2,1,0) and (4,1,0)). The (4,0,0) ARIMA model performed poorly in this setting emphasizing the importance of using both higher-order ARIMA models and differencing. We stress that our results are sensitive to the ARIMA models that we examine, and that the conclusions only apply to the tested models. It is possible that persistence measures derived from other ARIMA processes may have different relations to the economic factors that we employ. Also, it might be possible to identify other relatively stable, firm-specific, economic theory-supported variables that we have omitted.

Our results are of interest to accounting researchers who attempt to relate annual earnings persistence to earnings response coefficients because they often choose an ARIMA time-series model structure from which to derive their persistence measure. Our results suggest that researchers will obtain a better measure of the persistence implied by barriers-to-entry, product type, and capital intensity by using persistence measures from higher-order ARIMA models rather than from the lower-order models commonly used. To the extent that the market assessment of earnings persistence reflects such economic factors, the use of such higher-order measures of persistence will lead to more powerful tests of the relation between earnings persistence and earnings response coefficients.

Our study also raises the possibility that researchers and others might be able to use the economic characteristics directly rather than lower-order (or higher-order for that matter) ARIMA models for assessing persistence. It is probably the case that the efficacy of such a practical approach depends upon data availability and on what the researcher or investor

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Footnote 16 (Continued)

accounting effects are a cause of the *differences* in explanatory power across models. Nevertheless, rule changes can introduce noise into the earnings series. Also, accounting rules can remain constant but their application can vary, or rule changes and application variance can both occur. Collins et al. (1997) find evidence consistent with the idea that one-time write-offs have reduced the value relevance of earnings over recent years. The finding that one-time write-offs are a major determinant of the decline in earnings value relevance motivates our analysis of the sales series as well—a series that is unaffected by one-time write-offs.

[17] We did not expect capital intensity to be a significant variable in the sales persistence analysis since it relates to fixed charges in the expense series. It was not significant in any of the regression tests.

is trying to accomplish. In some cases, a sufficiently long time series is not available for direct estimation of earnings persistence. If the goal is explanation of security price changes associated with *current* earnings releases, then allowing earnings response coefficients to vary with current information on the economic characteristics instead of with direct time-series measures of persistence might yield higher explanatory power. Lev and Thiagarajan's (1993) use of fundamental scores to explain current security price movements represents one example of this approach in the sense that portions of the fundamental score are based on variables such as capital and R&D expenditures estimated using single-period data.

REFERENCES

Baginski, S., K. Lorek, and G. L. Willinger. 1993. Economic determinants of quarterly earnings data. *Quarterly Review of Economics and Finance* 33 (Spring): 87–100.

Bathke, A. W., K. Lorek, and G. L. Willinger. 1989. Firm size and the predictive ability of quarterly earnings data. *The Accounting Review* 64 (January): 49–68.

Bernard, V., and J. Thomas. 1990. Evidence that stock prices do not fully reflect the implications of current earnings for future earnings. *Journal of Accounting and Economics* 13 (December): 305–340.

Biddle, G. C., and G. S. Seow. 1991. The estimation and determinants of associations between returns and earnings: Evidence from cross-industry comparisons. *Journal of Accounting, Auditing, and Finance* 6 (Spring): 183–232.

Brown, L. 1993. Earnings forecasting research: Its implications for capital markets research. *International Journal of Forecasting* 9: 295–320.

———, and J. Han. 1996. Do stock prices fully reflect the implications of current earnings for future earnings for AR1 firms? Working paper, SUNY at Buffalo.

Caves, R. 1987. *American Industry: Structure, Conduct, Performance*. 6th edition. Englewood Cliffs, NJ: Prentice Hall.

Collins, D., and S. Kothari. 1989. An analysis of intertemporal and cross-sectional determinants of earnings response coefficients. *Journal of Accounting and Economics* 11 (July): 143–182.

———, E. Maydew, and I. Weiss. 1997. Changes in the value-relevance of earnings and book values over the past forty years. *Journal of Accounting and Economics* 24 (December): 39–68.

Connolly, R., and M. Hirschey. 1984. R&D, market structure and profits: A value-based approach. *Review of Economics and Statistics* 66: 682–686.

Darby, M. R. 1972. The allocation of transitory income among consumers' assets. *American Economic Review* 62 (December): 928–941.

Easton, P., and M. Zmijewski. 1989. Cross sectional variation in the stock market response to accounting earnings announcements. *Journal of Accounting and Economics* 11 (July): 117–142.

Eaton, B., and R. Lipsey. 1981. Capital, commitment, and entry equilibrium. *The Bell Journal of Economics* 12 (Autumn): 593–604.

Flavin, M. 1981. The adjustment of consumption to changing expectations about future income. *Journal of Political Economy* 89: 974–1009.

Foster, G. 1977. Quarterly accounting data: Time-series properties and predictive-ability results. *The Accounting Review* 52 (January): 1–21.

Friedman, M. 1957. *A Theory of the Consumption Function*. New York, NY: National Bureau of Economic Research, Inc.

Kamerschen, D. 1968. The influence of ownership and control on profit rates. *American Economic Review* 58 (June): 432–447.

Kendall, C. S., and P. Zarowin. 1990. Time-series models of earnings, earnings persistence and earnings response coefficients. Working paper, New York University.

Kormendi, R., and R. Lipe. 1987. Earnings innovations, earnings persistence, and stock returns. *Journal of Business* 60 (July): 323–345.

Lev, B. 1983. Some economic determinants of time-series properties of earnings. *Journal of Accounting and Economics* 5 (April): 31–48.

———, and S. R. Thiagarajan. 1993. Fundamental information analysis. *Journal of Accounting Research* 31 (Autumn): 190–215.

Lipe, R. 1990. The relation between stock returns and accounting earnings given alternative information. *The Accounting Review* 65 (January): 49–71.

———, and R. Kormendi. 1994. Mean reversion in annual earnings and its implications for security valuation. *Review of Quantitative Finance and Accounting* 4: 27–46.

Lorek, K. S., and G. L. Willinger. 1996. A multivariate time-series prediction model for cash-flow data. *The Accounting Review* 71 (January): 81–101.

Martin, S. 1988. Market power and-or efficiency. *Review of Economics and Statistics* 70 (May): 331–335.

McCleary, R., and R. A. Hay, Jr. 1980. *Applied Time-Series Analysis for the Social Sciences.* Beverly Hills, CA: Sage Publications, Inc.

Mueller, D. C. 1977. The persistence of profits above the norm. *Economica* 44 (November): 380–391.

Ou, J. A., and S. H. Penman. 1989a. Financial statement analysis and the prediction of stock returns. *Journal of Accounting and Economics* 11 (November): 295–329.

———, and ———. 1989b. Accounting measurement, price-earnings ratios and the information content of security prices. *Journal of Accounting Research* 27 (Supplement): 111–144.

Palepu, K., V. Bernard, and P. Healy. 1997. *Introduction to Business Analysis and Valuation.* Cincinnati, OH: Southwestern Publishing Company.

Palmer, J. 1973. The profit-performance effects of the separation of ownership from control in large U.S. industrial corporations. *Bell Journal of Economics and Management Science* 4 (Spring): 293–303.

Penman, S. H. 1992. Financial statement information and the pricing of earnings changes. *The Accounting Review* 67 (July): 563–577.

Ramesh, K. 1990. The existence of a unit root in earnings as a determinant of the price-earnings relation. Working paper, Michigan State University.

Rumelt, R. P. 1991. How much does industry matter? *Strategic Management Journal* 12: 167–185.

Scherer, R. M. 1973. *Industrial Market Structural and Economic Performance.* Chicago, IL: Rand McNally.

Stickney, C. 1996. *Financial Reporting and Statement Analysis:* 3rd edition. Ft. Worth, TX: The Dryden Press.

Stigler, G. J. 1963. *Capital and Rates of Return in Manufacturing Industries.* Princeton, NJ.: Princeton University Press.

Zarnowitz, V. 1972. Forecasting economic conditions: Record and prospects. In *The Business Cycle Today,* edited by V. Zarnowitz. New York, NY: National Bureau of Economic Research.

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BOOK REVIEWS

Thomas H. Williams, Editor

Editor's Note: Two copies of books for review should be sent to Professor Thomas H. Williams, McIntire School of Commerce, University of Virginia, Charlottesville, VA 22903-2493. The policy of *The Accounting Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.

RICHARD MATTESSICH, *Critique of Accounting: Examination of the Foundations and Normative Structure of an Applied Discipline* (Westport, CT: Quorum Books, 1995, pp. xix, 284, $65 Hb).

"This is an unconventional look at accounting, steeped in historical, methodological and moral aspects. Eliminating those considerations from our discipline would be no different than separating the roots from a plant. The ultimate objectives of this book are the professional and theoretical foundations as well as the normative structure of accounting." So begins a relatively rare phenomenon, a book about accounting that is not a textbook or "handbook," and one with a scope as vast as the subject itself, by an author equally rare in terms of breadth of scholarship. Perhaps for this reason alone it deserves a wide readership among accounting academics. Certainly, so many are the sub-objectives and sub-arguments within the book, that there is something to very much please (or displease) just about everyone with an interest in the nature of their subject and a reasonably open mind. This notwithstanding, much of the material has appeared previously in earlier (though widely scattered) publications by the author. The whole is in fact greater than the sum of the parts, and many of the parts are revised or entirely new.

The unconventional nature of the book, however, also rules out the conventional approach to book review, i.e., an ordered description of the content of each chapter, with a little bit of criticism so as not to appear lacking in insight, followed by recommendations regarding readership and academic use. The broad scope and heavy-duty content of the book make such a review problematic if reasonable brevity with understandability is to be realized. Yet if the ultimate purpose is to provide a basis for deciding whether to read the book, or use it in some class or the other, to some extent this should depend on whether one agrees there is a need for such a book.

To evidence that need, Mattessich appeals to recent expressions of disquiet as evidence of a "crisis" in accounting, most particularly to "A Statement of Academic Accounting," an unpublished but publicly distributed paper by Demski et al. (1991). Fortunately, since the paper never made it as far as Oklahoma, Mattessich summarizes it in chapter 1, in terms of five "symptoms of crisis" and six "reasons" given by the authors:

S1. Accounting research has failed to lead practice.
S2. Accounting research seems to lack a mechanism of regenerative force and does not have periodic cycles of innovation.
S3. Accounting research and teaching efforts have not moved accountants closer to any solution of fundamental problems, such as optimal choice of accounting standards and institutions.
S4. In accounting, there hardly seems to be any demand for academic researchers or their product by industry or the profession (with a possible exception in auditing).
S5. Accounting is considered a mere service area, with the M.B.A. major in accounting becoming an endangered species.

R1. Accounting researchers lack the courage as well as the monetary incentives necessary to challenge traditional paradigms.
R2. A weakness in entry-level Ph.D.s in terms of accounting and institutional knowledge.
R3. Insufficient correlation between research funding as well as remuneration, on the one hand, and results and relevancy of this research (except in the area of auditing), on the other.
R4. The transfer from accounting to finance of specific research areas (security analysis, valuation of financial instruments, and the like); i.e., too narrow a curriculum definition as well as lack of "entrepreneurship" in accounting. (One might add transfer to management/MIS here as well.)
R5. A tendency of senior faculty to evaluate the performance of their juniors on too narrow a basis, discouraging original or innovative research.
R6. Financial accounting, unlike finance, does not serve or respond to the free market and its forces much, but mainly serves institutions exercising regulatory functions, which is construed as a disincentive for practitioners to demand accounting research.

Mattessich both agrees and disagrees with elements of the foregoing, and adds some of his own in chapter 1, e.g., an over-emphasis of the valuation decision function at the expense of the stewardship function; and an ever-widening gap between the highly sophisticated theoretical issues explored in academia and the relative disregard these explorations encounter from practice, resulting from the attempt to convert a basically applied discipline into a positive science. The point is, if you believe that many of the symptoms are real and many of the reasons above are accurate, you should probably read this book, and have your doctoral students do likewise. And even if you do not, it is still in many other respects a "good read." For my own part, I have long believed and taught much of what Mattessich argues in this book, and will probably use the book in my Introduction to Accounting Research seminar for first-year Ph.D. students, but not just for purposes of academic introspection. This remains an impressive scholarly work, which offers considerable insight into the accounting research act, insight that is independent of the specific point of view of the author and the existence of any "crisis."

As Mattessich is quick to point out, the book is a "critique," not a criticism, of accounting, a critical examination of the extent to which accounting can and does represent its pertinent reality. Consequently, the next ten chapters (summarized in chapter 12) address numerous specific topics directly related to understanding the nature of accounting and accounting research. Just a few of these, to further whet or diminish the appetite: (1) the nature of reality, including an "onion model of reality," with total reality compared to an onion consisting of many layers—from ultimate reality (the subject of metaphysics), to physical, chemical, biological, mental, and social reality; (2) the paradigmatic structure of accounting, and the synthesis of extreme positions, between the American "positive accounting theory" view and the British "critical-interpretive" view of accounting; (3) the concepts of duality, input-output and symmetry; (4) a double classification theorem; (5) Bertrand Russell's "simple-minded" and "muddle-headed" approaches to systematic inquiry; (6) accounting as applied science rather than positive science; (7) the role of speculation and value judgments in accounting theory and research; (8) ethical-normative, pragmatic-normative, and conditional-normative accounting theory; (9) the nature of instrumental hypotheses; (10) the need for a comprehensive catalog of objectives and corresponding empirically determined means-end relations.

As a Ph.D. student, the first book that impressed me with its scholarship and fully engaged my interest was by Mattessich (*Accounting and Analytical Methods*, 1964). Now the most recent book to impress me is his latest, ironically both read at the urging of the same person. I, in turn, would urge academics on both sides of the Atlantic to seriously consider this book for use at the early doctoral level, since a main argument of the book is that a sensible view of accounting and accounting research probably lies "mid-ocean."

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JONATHON BARRON BASKIN AND PAUL J. MIRANTI, JR., *A History of Corporate Finance* (New York, NY: Cambridge University Press, 1997, pp. x, 350, $29.95 Hb).

A History of Corporate Finance is useful for students, scholars and practitioners interested in a historical overview of the practice and theory of finance. A central theme of the book revolves around the notion that an integrated study of organizational change and the development of financial theories makes it possible to evaluate the ways in which financial innovation has contributed to important efficiency gains throughout history. The authors point out that essentially four sets of circumstances influenced financial innovation over time, from the experience of Italian merchant banks during the Renaissance to that of contemporary conglomerates and leveraged buyout partnerships. First was the potential for realizing economies of scale and scope. Second was the determination that financial innovation could help firms capture gains from exogenous events. Third was the understanding that asymmetric information led to agency problems that could be eradicated with financial innovations. Fourth was the reduction in market inefficiencies made possible via financial innovations.

More specifically, each chapter focuses on a particular historical epoch and the major organizational and financial changes that occurred during the period. Case studies are provided as examples. The authors then conclude each chapter with a discussion of how the historical practice of finance in each epoch is linked to contemporary theories of finance. The introduction of the book provides a succinct historical overview of the modern theory of finance, including: the development of the efficient markets hypothesis, portfolio management and the development of the CAPM; the theory of optimal capital structure and dividend policy; and the effect of agency problems. The subsequent seven chapters examine in detail how risk, asymmetric information and organizations interacted during various historical periods to satisfy the financing requirements of emerging corporate entities. Overall the study is organized into three parts, each consisting of several chapters. The first part documents the problem of finance in the pre-industrial world, where agriculture and trade were the most important forms of economic activity. The second part of the book focuses on the financial innovations that occurred during the era of industrialization when the pace of change accelerated due to the increasing rate of innovation in technology and management. The third part of the book details the evolution of finance into the contemporary era.

In part one, the first chapter examines the development of large enterprises during the later Middle Ages and the Renaissance that were capable of achieving operational efficiencies via economies of scale and scope. At the forefront of this evolution were the Italian merchant banks. However, these gains were limited by the failure of contracting arrangements to control managerial actions. The subsequent chapter goes on to follow the economic expansion during the oceanic exploration during 1450–1720. The discovery of new geographic horizons opened opportunities for innovative enterprises to conduct large-scale and long-distance trading. To alleviate the concerns of prospective investors regarding the risk of these ventures, trading companies found it necessary to form close relationships with government. This gave rise to the joint stock company organizational form. Later, as financial markets became more established, financial innovations such as the fund of credit unified the interests of private groups and the state. The effect of taxes on the cost of capital is also examined. The emergence of public financial markets through 1815 is examined in the third chapter. During this period, England established itself as the world leader in financial markets. Four factors that affected this transformation are examined in detail.

The second part of the book traces financial developments during the rise of modern industry through the 1930s. The first chapter in this section examines how asymmetric information and the experience of early canal and railroad operations influenced the determination of corporate debt ratios. The next chapter focuses on the development of the New York Stock Exchange and fundamental business and economic changes that led to an increased role of common stock and the separation of ownership and control of firms during the first 40 years of the twentieth century.

The transition to the contemporary era is examined in the last part of the book. The initial chapter in this section evaluates how the corporate financing puzzle was resolved by manufacturing firms whose strong economic prosperity contributed to the post-World War II boom. The development of financial theories and the impact on the formation of new types of business organizations is discussed in the second chapter. In particular, the evolution of conglomerate firms is contrasted with that of leveraged buyout partnerships, each of which transformed modern corporate finance in different ways during the latter part of the twentieth century. Finally, the epilogue puts forth a theorem to address the relationship between firm-specific factors and environmental factors and the temporal impact on corporate finance by revisiting the question of history's role in economics.

In summary, the book provides a rich background and informed perspective regarding the effect of the evolution of organizations and financial practices on the historical development of modern corporate finance theories. The book is logically organized, thorough, and well written. The material contained therein is useful to anyone interested in a historical overview of corporate finance and it offers an interesting argument for integrating historical and quantitative methods to further the field of finance.

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BOOKS RECEIVED AUGUST 16, 1998 TO NOVEMBER 1, 1998

HARRY L. BROWN, *Design and Maintenance of Accounting Manuals* (New York, NY: John Wiley & Sons, Inc., 1998, xv, 555, Hb $135).

PATRICK R. DELANEY, BARRY J. EPSTEIN, JAMES R. ADLER, and MICHAEL F. FORAN, *Wiley GAAP 99: Interpretation and Application of Generally Accepted Accounting Principles* (New York, NY: John Wiley & Sons, Inc., 1998, li, 1011, Pb $62).

ISTEMI S. DEMIRAG, ed., *Studies in Managerial and Financial Accounting, Vol. 8, Corporate Governance, Accountability, and Pressures to Perform: An International Study* (Stamford, CT: JAI Press Inc., 1998, xv, 395, Hb $78.50).

MARK EDWARD, *Wiley CPA Examination Review Focus Notes: Accounting and Reporting, Auditing, Business Law, and Financial Accounting* (New York, NY: John Wiley & Sons, Inc., 1997, ranges from 125 pages to 238 pages, Pb $29.95 each).

RICHARD JANKOWSKI, *Profits, Taxes, and the State* (Westport, CT: Greenwood Publishing Group, 1998, x, 192, Hb $59.95).

GREGORY KITTER, *Investment Mathematics for Finance and Treasury Professionals: A Practical Approach* (New York, NY: John Wiley & Sons, Inc., 1999, xi, 275, Hb $69.95).

HERMAN MCDANIEL, *Computer Snafus* (Myrtle Beach, SC: Chicora Publishing, Inc., 1998, v, 248, Hb $22.95).

JOSEPH M. MORRIS, *Joint Ventures: Business Strategies for Accountants* (New York, NY: John Wiley & Sons, Inc., 1998, xviii, 316, Hb $115).

DOUG H. MOY, *Living Trusts: After the 1997 Taxpayer Relief Act* (New York, NY: John Wiley & Sons, Inc., 1998, xix, 427, Pb $39.95).

DOUG H. MOY, *Wealth Preservation: How to Start and Develop an Estate Planning Practice* (New York, NY: John Wiley & Sons, Inc., 1998, xvi, 464, Hb $75).

THOMAS A. PONEMON, ed., *Research on Accounting Ethics, Vol. 4* (Stamford, CT: JAI Press Inc., 1998, ix, 308, Hb $78.50).

THOMAS A. PORCANO, ed., *Advances in Taxation, Vol. 10* (Stamford, CT: JAI Press Inc., 1998, xiv, 210, Hb $78.50).

GARY JOHN PREVITS, and BARBARA DUBIS MERINO, *A History of Accountancy in the United States: The Cultural Significance of Accounting* (Columbus, OH: Ohio State University Press, 1998, xx, 577, Pb $24.95, Hb $55).

LAWRENCE REVSINE, DANIEL W. COLLINS, and W. BRUCE JOHNSON, *Financial Reporting & Analysis* (Englewood Cliffs, NJ: Prentice Hall, 1999, xviii, 988, Hb).

LAWRENCE B. M. SERVEN, *Value Planning: The New Approach to Building Value Every Day* (New York, NY: John Wiley & Sons, Inc., 1998, xvii, 217, Hb $65).

PATRICK H. SULLIVAN, *Profiting from Intellectual Capital: Extracting Value from Innovation* (New York, NY: John Wiley & Sons, Inc., 1998, xviii, 366, Hb $65).

Editorial Data

Manuscripts submitted to *The Accounting Review* are assigned two reviewers. The following table contains information about turnaround time for reviewed manuscripts for the 12-month period ended August 31, 1998. Turnaround time is the number of days between the date of the editor's letter to the author(s) and the date that the manuscript and submission fee were received:

	Number of Manuscripts	Cumulative Number	Cumulative Percent
0 ≤ Days ≤ 30	7	7	3.1
31 ≤ Days ≤ 60	50	57	25.6
61 ≤ Days ≤ 90	129	186	83.4
91 ≤ Days ≤ 120	34	220	98.7
121 ≤ Days	3	223	100.0

The mean review time was 73 days; the median review time was 74 days. A limited number of manuscripts are returned without review and such manuscripts are excluded from the turnaround time statistics reported above.

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The following faculty members have graciously donated their time and expertise to assist in evaluating manuscripts for *The Accounting Review* between June 1997 and May 1998. Their support is greatly appreciated—*The Editor.*

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EDITORIAL POLICY

According to the policies set by the Publications Committee (which were endorsed by the Executive Committee and were published in the *Accounting Education News*, June 1987), *The Accounting Review* "should be viewed as the premier journal for publishing articles reporting the results of accounting research and explaining and illustrating related research methodology. The scope of acceptable articles should embrace any research methodology and any accounting-related subject, as long as the articles meet the standards established for publication in the journal....No special sections should be necessary. The primary, but not exclusive, audience should be—as it is now—academicians, graduate students, and others interested in accounting research."

The primary criterion for publication in *The Accounting Review* is the significance of the contribution an article makes to the literature.

The efficiency and effectiveness of the editorial review process is critically dependent upon the actions of both authors submitting papers and the reviewers. Authors accept the responsibility of preparing research papers at a level suitable for evaluation by independent reviewers. Such preparation, therefore, should include subjecting the manuscript to critique by colleagues and others and revising it accordingly prior to submission. The review process is not to be used as a means of obtaining feedback at early stages of developing the research.

Reviewers and associate editors are responsible for providing critically constructive and prompt evaluations of submitted research papers based on the significance of their contribution and on the rigor of analysis and presentation. Associate editors also make editorial recommendations to the editor.

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The Accounting Review's manuscript preparation guidelines follow (with a sight modification) the B-format of the *Chicago Manual of Style* (14th ed.; University of Chicago Press). Another helpful guide to usage and style is *The Elements of Style*, by William Strunk, Jr., and E. B. White (Macmillan). Spelling follows *Webster's International Dictionary.*

FORMAT

1. All manuscripts should be typed on one side of 8½ × 11" good quality paper and be double spaced, except for indented quotations.
2. Manuscripts should be as concise as the subject and research method permit, generally not to exceed 7,000 words.
3. Margins of at least one inch from top, bottom and sides should facilitate editing and duplication.
4. To assure anonymous review, authors should not identify themselves directly or indirectly in their papers. Single authors should not use the editorial "we."
5. A cover page should show the title of the paper, the author's name, title and affiliation, any acknowledgments, and a footnote indicating whether the author would be willing to share the data (see last paragraph in this statement).

Pagination: All pages, including tables, appendices and references, should be serially numbered. The first section of the paper should be untitled and unnumbered. Major sections may be numbered in Roman numerals. Subsections should not be numbered.

Numbers: Spell out numbers from one to ten, except when used in tables and lists, and when used with mathematical, statistical, scientific, or technical units and quantities, such as distances, weights and measures. For example: *three days; 3 kilometers; 30 years.* All other numbers are expressed numerically.

Percentages and Decimal Fractions: In nontechnical copy use the word percent in the text.

Hyphens: Use a hyphen to join unit modifiers or to clarify usage. For example: *a well-presented analysis; re-form.* See *Webster's* for correct usage.

Key Words: The abstract is to be followed by four key words that will assist in indexing the paper.

ABSTRACT/INTRODUCTION

An Abstract of about 100 words should be presented on a separate page immediately preceding the text. The Abstract should concisely inform the reader of the manuscript's topic, its methods and its findings. Key Words and the Data Availability statements should follow the Abstract. The text of the paper should start with a section labeled "I. Introduction," which provides more details about the paper's purpose, motivation, methodology and findings. Both the Abstract and the introduction should be relatively non-technical, yet clear enough for an informed reader to understand the manuscript's contribution. The manuscript's title, but neither the author's name nor other identification designations, should appear on the Abstract page.

TABLES AND FIGURES

The author should note the following general requirements:

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2. A reference to each graphic should be made in the text.
3. The author should indicate by marginal notation where each graphic should be inserted in the text.
4. Graphics should be reasonably interpreted without reference to the text.
5. Source lines and notes should be included as necessary.

Equations: Equations should be numbered in parentheses flush with the right-hand margin.

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Citations: Work cited should use the "author-date system" keyed to a list of works in the reference list (see below). Authors should make an effort to include the relevant page numbers in the cited works.

1. In the text, works are cited as follows: authors' last name and date, without comma, in parentheses: for example, (Jones 1987); with two authors: (Jones and Freeman 1973); with more than two: (Jones et al. 1985); with more than one source cited together (Jones 1987; Freeman 1986); with two or more works by one author: (Jones 1985, 1987).
2. Unless confusion would result, do not use "p." or "pp." before page numbers: for example, (Jones 1987, 115).
3. When the reference list contains more than one work of an author published in the same year, the suffix a, b, etc. follows the date in the text citation: for example, (Jones 1987a) or (Jones 1987a; Freeman 1985b).
4. If an author's name is mentioned in the text, it need not be repeated in the citation; for example, "Jones (1987, 115) says...."
5. Citations to institutional works should use acronyms or short titles where practicable; for example, (AAA ASOBAT 1966); (AICPA Cohen Commission Report 1977). Where brief, the full title of an institutional work might be shown in a citation: for example, (ICAEW The Corporate Report 1975).
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Reference List: Every manuscript must include a list of references containing only those works cited. Each entry should contain all data necessary for unambiguous identification. With the author-date system, use the following format recommended by the *Chicago Manual*:

1. Arrange citations in alphabetical order according to surname of the first author or the name of the institution responsible for the citation.
2. Use author's initials instead of proper names.
3. Date of publication should be placed immediately after author's name.
4. Titles of journals should not be abbreviated.
5. Multiple works by the same author(s) in the same year are distinguished by letters after the date.
6. Inclusive page numbers are treated as recommended in *Chicago Manual* section 8.67.

Sample entries are as follows:

American Accounting Association, Committee on Concepts and Standards for External Financial Reports. 1977. *Statement on Accounting Theory and Theory Acceptance*. Sarasota, FL: AAA.

Demski, J. S., and D. E. M. Sappington. 1989. Hierarchical structure and responsibility accounting. *Journal of Accounting Research* 27 (Spring): 40–58.
Dye, R., B. Balachandran, and R. Magee. 1989. Contingent fees for audit firms. Working paper, Northwestern University, Evanston, IL.
Fabozzi, F., and I. Pollack, eds. 1987. *The Handbook of Fixed Income Securities*. 2nd edition. Homewood, IL: Dow Jones-Irwin.
Kahneman, D., P. Slovic, and A. Tversky, eds. 1982. *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge, U.K.: Cambridge University Press.
Porcano, T. M. 1984a. Distributive justice and tax policy. *The Accounting Review* 59 (October): 619–636.
———. 1984b. The perceived effects of tax policy on corporate investment intentions. *The Journal of the American Taxation Association* 6 (Fall): 7–19.
Shaw, W. H. 1985. Empirical evidence on the market impact of the safe harbor leasing law. Ph.D. dissertation, University of Texas at Austin.
Sherman, T. M., ed. 1984. *Conceptual Framework for Financial Accounting*. Cambridge, MA: Harvard Business School.

Footnotes: Footnotes are not used for documentation. Textual footnotes should be used only for extensions and useful excursions of information that if included in the body of the text might disrupt its continuity. Footnotes should be consecutively numbered throughout the manuscript with superscript Arabic numerals. Footnote text should be doubled-spaced and placed at the end of the article.

SUBMISSION OF MANUSCRIPTS

Authors should note the following guidelines for submitting manuscripts:

1. Manuscripts currently under consideration by another journal or publisher should not be submitted. The author must state that the work is not submitted or published elsewhere.
2. In the case of manuscripts reporting on field surveys or experiments, four copies of the instrument (questionnaire, case, interview plan or the like) should be submitted.
3. Four copies should be submitted together with a check in U.S. funds for $75.00 for members or $100.00 for nonmembers of the AAA made payable to the American Accounting Association. Effective January 1990, the submission fee is nonrefundable.
4. The author should retain a copy of the paper.
5. Revisions must be submitted within 12 months from request, otherwise they will be considered new submissions.

COMMENTS

Comments on articles previously published in *The Accounting Review* will be reviewed (anonymously) by two reviewers in sequence. The first reviewer will be the author of the original article being subjected to critique. If substance permits, a suitably revised comment will be sent to a second reviewer to determine its publishability in *The Accounting Review*. If a comment is accepted for publication, the original author will be invited to reply. All other editorial requirements, as enumerated above, also apply to proposed comments.

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The following policy has been adopted by the Executive Committee in its April 1989 meeting.

"An objective of (*The Accounting Review, Accounting Horizons, Issues in Accounting Education*) is to provide the widest possible dissemination of knowledge based on systematic scholarly inquiries into accounting as a field of professional research, and educational activity. As part of this process, authors are encouraged to make their data available for use by others in extending or replicating results reported in their articles. Authors of articles which report data dependent results should footnote the status of data availability and, when pertinent, this should be accompanied by information on how the data may be obtained."

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1. To review the three previous committees' reports and other important background material.
2. To follow the accreditation activities of the AACSB, as well as other developments in accreditation.
3. To coordinate closely with the Accounting Programs Leadership Group in developing accreditation resources for department chairs. (Review recent accreditation visits and reports, and identify common strengths, weaknesses and needs of accounting programs.)
4. To inform the Executive Committee of accreditation issues as they arise and recommend policies or positions as appropriate.
5. To work closely with the association Webmaster to provide accreditation resources on the Internet for AAA members.

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(A Standing Committee of the Association)

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1. To review the three previous committees' reports and other important background material, including the report of the 1998–99 Continuing Education Committee.
2. To develop and issue position statements on matters relating to accounting education.
3. To develop and recommend to the Executive Committee educational policies for the Association.
4. To coordinate the activities of the Association in the field of accounting education with emphasis on accounting education research, publication and dissemination.
5. To work with the Research Advisory Committee (RAC) and the faculty development director to coordinate and implement the Association's faculty program development activity—including the:
   a. Coordination of faculty and program development among the Accounting Education Advisory Committee, the Research Advisory Committee, the Webmasters Committee, sponsoring organizations, headquarters' personnel and the faculty development director.
   b. Consideration of recommendations from committees charged to improve member services, such as the Membership Services and Subscriptions Committee, the Committee to Promote Interaction Between Two-year College Faculty and Faculty at Other Institutions, and the Globalization Initiatives Committee.
   c. Evaluation of alternatives to improve the efficiency and effectiveness of processes used in implementing faculty and program development.
   d. Proposal of a detailed budget, in conjunction with the executive director and the director of faculty development, to the Executive Committee and allocate, where authorized, funds specifically designated for this function, including any grants that might be a part of the program.
   e. Facilitation of the continuing education program at the annual convention.
   f. Implementation of Continuing Education (CE) initiatives. As part of the implementation, consider:
      1. Acquisition from existing sources, such as accounting firms, companies and professional organizations.
      2. Development of courses or materials from competent preparers.
   g. Evaluation of the need for modifications in CE courses and materials through participant exit measures.
   h. Consideration of the need for CE delivery venues other than the Annual, Section and Region:
      1. State-wide accounting educators' associations.
      2. Large metropolitan areas.
      3. Alliances with professional organizations.
   i. Refinement of the matrix of competencies by soliciting input from various interest groups (sections) and members with different intellectual interests.
   j. To work with the RAC, the faculty development director, Regions, Sections and the Program Advisory Committee to suggest and sponsor educators' (teaching, curriculum, etc.) sessions at national, Regional and Section meetings.
   k. Filing of progress reports with the director of education and the Executive Committee by October 31, 1998, February 28, 1999, and July 15, 1999.
6. To assist education-designated committees, such as the New Faculty Consortium Planning Committee, Professional Examinations Committee, and the Innovations in Accounting Education Award committee.

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Alexander Gabbin, James Madison University
Ken Harper, DeAnza College
Elizabeth Brown, Keene State College
Jennifer Francis, University of Chicago
Leroy J. Pryor, California State University, Chico

AICPA/AAA COLLABORATIVE AWARD COMMITTEE
(Joint with the AICPA)

Charge: To select the recipient(s) of the award according to the agreement between the AICPA and the Association.

Chair:

AAA
Larry R. Davis
Accounting Faculty
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AICPA
William G. Shenkir
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McIntire School of Commerce
Monroe Hall
Charlottesville, VA 22903
Phone: (804) 924-4146
Fax: (804) 924-7074
Email: wgs2z@virginia.edu

Members:

Walter Kelly	Clifton Gunderson & Co.
Gayle Rayburn	Southeast Missouri State University
Bill Bentz	Ohio State University
Greg Trompeter	Boston College
Peter A. Aghimien	Indiana University South Bend
Ellen Glazerman	Ernst & Young LLP
Charles F. Malone	North Carolina A&T State University
Richard Tabor	Auburn University

BY-LAWS COMMITTEE
(A Standing Committee of the Association)

Charge:

1. To review the three previous committees' reports and other important background material.
2. To review existing Association's By-Laws and recommend revisions where conflicts exist to the Executive Committee.
3. To analyze any proposed changes in the By-Laws and recommend to the Executive Committee changes in form or conflict that are not anticipated by such proposals.

Chair: O. Ray Whittington
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School of Accountancy
DePaul University
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Fax: (312) 362-6208
Email: rwhitting@wppost.depaul.edu

Members: Urton Anderson, University of Texas at Austin
Paul Copley, University of Georgia

COMMITTEE TO PROMOTE INTERACTION BETWEEN TWO-YEAR COLLEGE FACULTY AND FACULTY AT OTHER INSTITUTIONS

Charge: To facilitate interaction between two-year faculty and the activities of four-year and graduate colleges—specifically:

1. To review the three previous committees' reports and other important background material.
2. To recommend measures to the Executive Committee that will serve the AAA's two-year college members and prospective members. In carrying out this aspect of the charge, the Committee should exchange information with the Membership Services and Subscriptions Committee.
3. To promote membership of two-year college faculty in the Association, including assisting with any membership initiatives by the Membership Services and Subscriptions Committee, regions, sections, or other appropriate bodies in the Association.
4. To contribute to effective instructional initiatives undertaken by headquarters' staff involved in faculty and program development, the regions and the sections.
5. To encourage four- and five-year schools that have high numbers of transfers from two-year schools to work closely (through seminars, etc.) with their major two-year providers and the AAA faculty development director to ensure that curricula are current, that critical skills and knowledge are being taught, and that they are keeping pace with the rapidly changing business environment.
6. To work with the Membership Services and Subscriptions Committee to determine how two-year members can fit better in the AAA, whether there should be institutional membership for two-year colleges, and how the AAA can better serve two-year members.
7. Prepare a detailed report to the Executive Committee by February 29, 1999.

Co-chairs:

Susan V. Crosson
Business Program
Santa Fe Community College
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Alan Reinstein
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Member: Andrew Lawrence, Delgado Community College
Barbara Chiappetta, Nassau Community College
Emmett Griner, Georgia State University
Fran Ayres, Oklahoma University
Steve Crow, California State University, Sacramento
Janet Cassagio, Nassau Community College
Ken Harper, AEAC Liaison, DeAnza College

COMPETITIVE MANUSCRIPT COMMITTEE

Charge: To select one, two or (at most) three recipient(s) of the Competitive Manuscript Award, using criteria approved by the Executive Committee.

Chair: Ross Jennings
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Members: Mike Shields, Michigan State
Dan Simunic, University of British Columbia
Rick Young, Ohio State University
D. Shores, University of Washington
Robert Bloomfield, Cornell University
Maureen McNicholas, RAC Liaison, Stanford University

CORPORATE ACCOUNTING POLICY SEMINAR COMMITTEE

Charge: To plan and hold the Corporate Accounting Policy Seminar in accordance with established AAA policies specifically:

1. To review the three previous committees' reports and other important background material.
2. To plan for and arrange to have the 1999 seminar conducted and administered.
3. To ensure that adequate funding is received for the Corporate Accounting Policy Seminar.
4. To keep the AAA membership, through the Internet or other means, informed of:
   a. Developments in the corporate accounting community.
   b. Research opportunities in the corporate accounting sector.
5. To report on the results and effectiveness of the seminar and to recommend any changes to the Executive Committee by October 15, 1999.

Chair: Richard G. Sloan
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University of Michigan
701 Tappan Street
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Email: sloanr@umich.edu

Members: Steve Berlin, University of Tulsa
William J. Ihlanfeldt, IMA
Joseph Martin, IBM
John Hand, University of North Carolina
Bob Lipe, RAC Liaison, University of Oklahoma
Lee Pryor, AEAC Liaison, California State University, Chico

DELOITTE & TOUCHE WILDMAN MEDAL AWARD COMMITTEE

Charge: To administer the John R. Wildman Medal award program in accordance with the terms of the grant from the Deloitte & Touche Foundation.

Chair: Thomas G. Evans
School of Accounting
College of Business Administration
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Fax: (407) 823-5741
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Members: Lester Chadwick, University of Delaware
Ron Worsham, Brigham Young University
Robin Roberts, Central Florida University
Cliff Brown, Bentley College
Russ Petersen, University of Texas at Arlington (visiting Seattle University)
Abdel Agami, Old Dominion University
James Crockett, Southern Mississippi University
Mark Chain, Deloitte & Touche LLP
Linda McDaniel, RAC Liaison, University of North Carolina

DISTINGUISHED INTERNATIONAL FACULTY EXCHANGE COMMITTEE

Charge: To oversee the faculty exchange program and assist Association staff in the administration of the program—specifically:

1. To review the three previous committees' reports and other important background material.
2. To select the U.S./Canadian professor and the foreign professor to be involved in the program for the year 2000 tour and to select the schools in the United States and Canada for the 1999 lecture tour.
3. To select the area for the 2001 visit by the US/Canadian professor.
4. To assist the executive director with announcements, arrangements and follow-up evaluations for the respective visits.

Chair: Shahrokh Saudagaran
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Members: John Ahern, DePaul University
Rajiv Banker, University of Texas at Dallas
Chee Chow, San Diego State University
Masako Darrough, University of California, Davis
John Langli, Norwegian School of Management
Ross Watts, University of Rochester
R. S. O. Wallace, King Fahd University of Petroleum & Minerals
Steve Zeff, Rice University

DOCTORAL CONSORTIUM COMMITTEE

Charge: To plan and hold the 1999 Doctoral Consortium in accordance with established AAA policies—specifically:

1. To review the three previous committees' reports and other important background material.
2. To plan for and arrange to have the 1999 consortium conducted and administered.
3. To report on the results and effectiveness of the consortium and to recommend any changes to the Executive Committee by August 31, 1999.

Chair: Grace Pownall
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Members: Mark Nelson, Cornell University
Robert Bushman, University of Chicago
Catherine Schrand, Wharton School
Bryan Cloyd, University of Texas at Austin
Shannon Anderson, RAC Liaison, University of Michigan

DOCTORAL FELLOWSHIPS COMMITTEE

Charge:

1. To review the three previous committees' reports and other important background material.
2. To select the 1998–99 recipients of the American Accounting Association doctoral fellowship grants using the criteria established by the Executive Committee.
3. To evaluate the doctoral fellowship grant program and recommend changes, as appropriate, to the Executive Committee.

Chair: Sally Jones
Monroe Hall
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Fax: (804) 924-7074
Email: smj7@virginia.edu

Members: Kung Chen, University of Nebraska
Kirsten Ely, Emory University
Bala Dharan, Rice University
Joseph Paperman, University of Washington
Morton Pincus, University of Iowa
Belverd Needles, AEAC Liaison, DePaul University

FACULTY DEVELOPMENT ADVISORY COMMITTEE

Charge: The Faculty Development Advisory Committee serves in an advisory capacity to the AAA faculty development function. This committee will provide the executive director and the director of faculty development a sounding board to advise on new initiatives and suggest priorities. This committee will also provide input into reporting AAA faculty development efforts to the Sponsors' Task Force and the AAA membership. The advisory committee will have no direct responsibility for evaluating the director of faculty development, but will, if requested, provide relevant input to such an evaluation to the executive director.

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Members: Catherine Schrand, Wharton School
Joe Mori, San Jose State University
Wil Uecker, Rice University
Michael Fetters, Babson College
Dave Campbell (AAPG), Case Western Reserve University
Amy Hutton (RAC), Harvard University
Craig Polhemus, AAA
Tracey Sutherland, AAA

FINANCE COMMITTEE
(Standing Committee of the Association)

Charge: To develop financial goals and strategies for the Association—specifically:

1. To review the three previous committees' reports and other important background material.
2. To evaluate additional or alternative ways to finance existing Association activities.
3. To plan financial strategies for Association initiatives and activities.
4. To work with the 1998–1999 President-elect in preparing the 1999–2000 budget.
5. To monitor the investment of AAA funds in accordance with established Executive Committee policies and procedures.
6. To oversee the budgeting system for the association, including appropriate costing of products and services: The part of the project dealing with publications should be coordinated with the Publications Committee.
7. To review, as needed, association costs (such as employee benefits) and recommend changes, as appropriate.

8. To keep AAA members informed of finance committee activities by publishing finance committee minutes in *Accounting Education News.*

Chair: Brent C. Inman
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Email: brent.inman@us.coopers.com

Members: Jan Williams, University of Tennessee
Lane Anderson, Texas Tech University
Rhoda Icerman, Florida State University
Karen Hooks, Florida Atlantic University
Paul Copley, University of Georgia
Geoffrey Spinkle, University of Wisconsin

FINANCIAL ACCOUNTING STANDARDS COMMITTEE
(A Standing Committee of the Association)

Charge: To coordinate all Association activities with respect to financial accounting standard setting—specifically:

1. To evaluate selected discussion memoranda and exposure drafts related to financial accounting and reporting in the private sector as they are released by the FASB and other accounting standard-setting groups, and to respond to those groups in writing and by appearing at selected public hearings.
2. To be cognizant of emerging issues related to financial accounting and reporting in the private sector through materials issued by the Emerging Issues Task Force and other relevant sources with evaluation, where appropriate, of the significance and potential implications of such issues.
3. To meet with the FASB, normally on an annual basis.
4. To evaluate selected discussion memoranda and exposure drafts related to financial accounting and reporting as they are released by the IASC and to respond to the IASC in writing.
5. Recognize emerging international issues related to financial accounting, reporting and auditing; alert others inside the Association about their importance to determine the likely significance and potential implications of such issues.
6. To explore the publication of selected responses by the committee in *Accounting Horizons* or other appropriate outlets.
7. To consider and promote ways to increase the quantity and quality of academic input to the standard-setting process.
8. To keep the AAA membership, through the Internet of other means, informed of developments in financial accounting standards.

Chair: James M. Wahlen
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Members: Ross G. Jennings, University of Texas at Austin
Bob Herz, PricewaterhouseCoopers LLP
Jim Boatsman, Arizona State University
Greg Jonas, Arthur Andersen LLP
Kathy Petroni, Michigan State University
Krishna Palepu, Harvard University
Katherine Schipper, University of Chicago
Steve Ryan, New York University

FINANCIAL REPORTING ISSUES CONFERENCE COMMITTEE

Charge: To plan and hold the 1999 Financial Reporting Issues Conference in accordance with established AAA policies—specifically:

1. To review the three previous committees' reports and other important background material.
2. To seek the advice of appropriate Association committees on the content and structure of the 1999 conference.
3. To arrange to have the conference conducted and administered.
4. To report on the results and effectiveness of the conference and to recommend any changes to the Executive Committee.

Chair: Stephen Ryan
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email: sryan@stern.nyu.edu

Members: Jim Leisenring, FASB
Todd Johnson, FASB
Greg Jonas, Arthur Andersen LLP
Doug Skinner, University of Michigan
Mohan Venkatachalem, RAC Liaison, Stanford University

GLOBALIZATION INITIATIVES COMMITTEE

Charge:

1. To review the previous committee's report and other important background material.
2. To work with the Executive Committee, the International Accounting Section, and others within and outside the Association, as appropriate, to:
   a. Keep the AAA Executive Committee appraised of all international activities involving Association members.
   b. Recommended Executive Committee involvement in international activities.
   c. Develop a plan to facilitate international faculty interchange among countries, focused directly on identifying and publicizing opportunities.
   d. Recommend actions to accelerate the globalization of the Association.
3. To contribute ideas to headquarters' staff involved in faculty development that represent the interests of international members.
4. To make recommendations about how the Globalization Initiative Committee, the AAA Executive Committee and the International Sections should interface and interact.
5. To keep AAA members, through the use of the Internet or other means, informed of:
   a. Globalization issues about which they should be aware.
   b. Research opportunities related to global issues.

Co-Chairs: Edward P. Swanson
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Members: Dennis Beresford, University of Georgia
K. Hung Chan, Chinese University of Hong Kong
Hans J. Dykxhoorn, Western Michigan University
Marcus Massoud, Claremont McKenna College
Clare Roberts, University of Aberdeen
Gyan Chandra, Miami University
Kevin Chen, Hong Kong University of Science and Technology (visiting from Rutgers)
C. S. Agnes Cheng, University of Houston
Barbara Trenholm, University of New Brunswick
Andy Lymer, University of Birmingham

INNOVATION IN ACCOUNTING EDUCATION AWARD COMMITTEE

Charge:
1. To review the three previous committees' reports and other important background material.
2. To select the recipient(s) of the Innovation in Accounting Education Award, using the criteria approved by the Executive Committee.
3. To summarize, describe and include on the Internet, projects or innovations nominated for the award.
4. To consider the criteria for the award and recommend changes, as appropriate.

Chair: Mary Alice Seville
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Email: seville@bus.orst.edu

Members: William Raabe, Samford University
David Cottrell, Brigham Young University
Sherry Mills, New Mexico State
Irv Nelson, Utah State University
Mike Wilk, Ernst & Young LLP
Jim Stice, AEAC Liaison, Brigham Young University

INTERNATIONAL ACCOUNTING RESEARCH COMMITTEE

Charge: To plan and hold an International Accounting Research Conference in accordance with established Association policies—specifically:
1. To review the prior committee's report.
2. To arrange to have the 1999 conference conducted and administered.
3. To report on the results and effectiveness of the conference and to recommend any changes to the Executive Committee within three months after the completion of the conference.

Chair: Mark DeFond
ACC 101D
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Members: T. J. Wong, Hong Kong University of Science and Technology
Gary Biddle, Hong Kong University of Science and Technology
Donna Street, James Madison University
Robert Roussey, University of Southern California
Jevons Lee, Tulane University
Finley Graves, Kansas State University
Earl K. Stice, Brigham Young University

MEMBERSHIP SERVICES AND SUBSCRIPTIONS COMMITTEE

Charge: To work with the Association staff and other AAA committees to define and enhance the benefits of membership—specifically:

1. To review the three previous committees' reports and other important background material.
2. To exchange information with the Committee to Promote Interaction Between Two-Year College Faculty and Faculty at Other Institutions, and the Retired Members Committee.
3. To work with appropriate headquarters' staff in upgrading the Association's database of accounting educators, including the potential use of the databases contained in the *Accounting Faculty Directory* by James R. Hasselback and published by Prentice Hall, and in the database for two-year schools compiled by Joe Rhile.
4. To make specific recommendations for serving various subsets of members and for attracting potential non-members in high population groups.
5. Work with the Finance and other appropriate committees to consider a new dues structure for "corporate" and community college members.
6. Working with the AAA Executive Director, correspond with all non-renewing members to determine:
   a. Why they didn't rejoin; and
   b. What actions the AAA can take to solve commonly perceived needs and problems.
7. Based on member preferences, to contribute to instructional initiatives undertaken by headquarters' staff involved in faculty and program development, the AEAC and RAC, the regions and the sections.
8. To identify potential new services the AAA could offer to members.
9. Present a membership services and retention plan to the Executive Committee by February 28, 1999.

Co-chairs: Kevin D. Stocks
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Members: Anthony Krzystofik, University of Massachusetts Emeritus
Lamont Steedle, Towson University
James Hasselback, Florida State University
Michel Lebas, Hautes Etudes Comm de Paris
Bruce Samuelson, Pepperdine University
Marc Rubin, Miami University
Elizabeth Oliver, Washington and Lee University
Peggy Hite, Indiana University
Mandira Sankar, University of Southern California
Barry Doll, PricewaterhouseCoopers LLP
Lynn Mazzola, Nassau Community College

MINORITY FACULTY DEVELOPMENT COMMITTEE

Charge: To coordinate Association activities with respect to minority recruitment and development specifically:

1. To identify issues of broad concern to minority faculty members and suggest ways the Association can help address these issues.
2. To explore ways in which potential minority candidates can be encouraged to apply to accounting programs and pursue professional careers in accounting education, including liaison with the KPMG Ph.D. project, NABA, INROADS and other groups interested in minority issues, and suggest ways the AAA can assist or work with them or can benefit from their work.
3. To recommend specific steps to the Executive Committee by February 28, 1999.

Chair: Jenice J. Prather
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Members: Bernard Milano, KPMG Peat Marwick LLP
Ben Uzoaru, Southeast Missouri State
Jack Roberston, University of Texas at Austin
Barron Harvey, Howard University
George Jackson, Elizabeth City State University
Alan Boston, Ernst & Young, LLP

NEW FACULTY CONSORTIUM COMMITTEE

Charge: To plan and hold the 1999 New Faculty Consortium in accordance with established AAA policies—specifically:

1. To review the three previous committees' reports and other important background material.
2. To arrange to have the consortium conducted and administered.
3. To report on the results and effectiveness of the consortium and to recommend any changes to the Executive Committee by February 28, 1999.

Chair: Carolyn Callahan
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University of Notre Dame
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Members: Dennis Reigle, Arthur Andersen LLP
Paul Simko, Emory University
Steve Matsunaga, University of Oregon
Jane Kennedy, University of Washington
Zoe-Vonna Palmrose, University of Southern California
Ella Mae Matsumura, AEAC Liaison, University of Wisconsin–Madison
Charles Lee, RAC Liaison, Cornell University

NOMINATIONS COMMITTEE

(Standing Committee of the Association)

Charge: To select a list of nominees to AAA offices for election by the membership in August 1999 and carry out other duties specified in the By-Laws and Policy and Procedures Manual.

Chair: Katherine Schipper
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Fax: (773) 702-4318
Email: katherine.schipper@gsb.uchicago.edu

Members: Steve Albrecht, Brigham Young University
Kevin Stocks, Brigham Young University
Sandra Kramer, University of Florida
Paula Thomas, Middle Tennessee State
Carolyn Callahan, Notre Dame University
Jerry Weygandt, University of Wisconsin–Madison

NOTABLE CONTRIBUTIONS TO ACCOUNTING LITERATURE AWARD SCREENING COMMITTEE

Charge: To identify works of exceptional merit from published accounting books and articles that meet the guidelines for the "Notable Contributions" award, as established by the Executive Committee.

Chair: David A. Guenther
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Members: KR Subramanyan, University of Southern California
Doug Shackelford, University of North Carolina
Steve Kachelmeier, University of Texas at Austin
Connie Weaver, University of Wisconsin
Donna Philbrick, Portland State
Somnath Das, University of Illinois at Chicago
Paul Brown, New York University
Jim Largay, Lehigh University
Mary Beth Mohrman, University of Missouri–St. Louis
Dena Johnson, Texas Tech University
Claire Latham, Washington State University
Joe Paperman, University of Washington
Andrew Cuccia, University of Illinois
Dan Stone, University of Illinois
Ilia Dichev, University of Michigan
Froystein Gjesdal, Norwegian School of Economics
Lisa Koonce, University of Texas at Austin
Mahmoud Nourayi, Loyola Marymount University
S.E.C. (Claire) Purvis, California State University, San Bernardino
Paul Munter, University of Miami
Dave Ricchuite, Notre Dame University
Thomas Lys, Northwestern University
Thomas Zeller, Loyola University Chicago
Walt Blacconiere, Indiana University
Bala Dharan, Rice University
Leslie Eldenburg, University of Arizona
D. Jordon Lowe, University of San Diego

NOTABLE CONTRIBUTIONS TO ACCOUNTING LITERATURE AWARD SELECTION COMMITTEE

Charge: To select the recipient(s) of the award from those books and articles identified by the Screening Committee as potentially notable contributions in accounting literature.

Chair: Mary Stone
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Members: Robert Trezevant, Univ. of Southern California
Jim Ohlson, New York University
George Foster, Stanford University
Faye Borthick, Georgia State
William Messier, Georgia State
Mark Beasley, North Carolina State
Tom Frecka, Notre Dame
Rick Tabor, Auburn University
Bill Shenkir, University of Virginia
Jamie Pratt, RAC Liaison

OUTSTANDING ACCOUNTING EDUCATOR AWARD COMMITTEE

Charge: To select one or (at most) two recipient(s) of the Outstanding Accounting Educator Award, using criteria approved by the Executive Committee.

Chair: Hadley P. Schaefer
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Members: Larry Tomassini, Ohio State University
Jim Fremgen, Naval Postgraduate School
Don Madden, University of Kentucky
Tom Dyckman, Cornell University
Anna Fowler, University of Texas at Austin
Larry Revsine, Northwestern University

PRACTICE ADVISORY COMMITTEE

Charge: To provide advice and support for the Vice President/Practice and the President-Elect on the implementation of the strategic plan in the goal area of "Contribute to Excellence in Accounting Practice."

To develop and implement a practice (corporate) relations program for the association.

Co-chairs: Brent C. Inman
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Members: William Holder, University of Southern California
D. Gerald Searfoss, University of Utah
Gary Luoma, University of South Carolina
Dave Pearson, Ernst & Young LLP
Sam Vitkoski, BDO Seidman LLP
Dave Landsittel, Arthur Andersen LLP

PROFESSIONAL EXAMINATIONS COMMITTEE

Charge:

1. To conduct activities as appropriate to assist communication and interaction between the membership of the Association and the various professional accounting examination bodies.
2. To monitor activities of these professional bodies.
3. To evaluate the implications of their respective examinations for accounting education.
4. To work to ensure that changes made to professional exams are consistent with the needs and research of AAA members.
5. To work closely with the AICPA as they make major changes to the CPA Exam.

Chair: Richard E. Ziegler
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Members: Annhenrie Campbell, California State University, Stanislaus
Patrick Delaney, Northern Illinois University
William Cenker, John Carroll University
Bea Sanders, AICPA
John Marts, University of North Carolina at Wilmington
William Holder, University of Southern California
Priscilla S. Payne, IMA
Peter Orsburn, IIA

PROFESSIONALISM AND ETHICS COMMITTEE

Charge: To foster ethical conduct among members and ethics education and scholarship in the accounting profession—specifically:

1. To review the three previous committees' reports and other important background material.
2. To explore avenues for fostering ethics education and scholarship over time and, where appropriate, to make recommendations to the Executive Committee. The options to be explored will include a possible revision of the case book produced by the committee in prior years.
3. To propose and, if approved, organize and conduct CPE and concurrent sessions at the regional and national meetings, as warranted.
4. To act as a resource on ethics in the accounting profession to the Executive Committee, regions, sections, other committees and other groups.
5. To work with the Webmasters committee to include teaching materials (cases, teaching notes, syllabi, etc.) related to ethics on the Internet.

Chair: Mary Beth Armstrong
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Laurie Pant, Suffolk University
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Morley Lemon, University of Waterloo
John Sweeney, Washington State University
Linda Thorne, York University
Carol Venable, San Diego State University

PROGRAM ADVISORY COMMITTEE

Charge: To assist the President and the Executive Director in developing the technical program for the 1999 Annual Meeting in San Diego.

Chair: W. Bruce Johnson
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Ellen Sweatt, Georgia Perimeter College
Karen Fortin, University of Baltimore
Don Deis, Louisiana State University
Vicky Arnold, Texas Tech University
Bill Schwartz, Virginia Commonwealth University
Keith Stanga, University of Tennessee
Andy Spero, University of Minnesota

PUBLICATIONS COMMITTEE
(Standing Committee of the Association)

Charge: To monitor and coordinate all aspects of the Association's publications program—specifically:

1. To report periodically to the President and Executive Committee on all matters of concern in the field of publications-including:
   a. Appropriate library subscription rates.
   b. Other matters as appropriate.
2. To recommend candidates for Editor-Elect positions as appropriate.
3. To evaluate and monitor trends in electronic publishing in order to sustain subscription revenues of the Association.
4. To determine whether one or more AAA publications should be published electronically and, if so, how subscription revenues can be sustained.
5. To recommend changes in AAA publications to the Executive committee as deemed desirable.

Chair: Robert J. Sack
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Jean Wyer, PricewaterhouseCoopers LLP
Philip Reckers, Arizona State University
Gary Previts, Case Western Reserve University
Robert Libby, Cornell University
Sandra Kramer, University of Florida

RESEARCH ADVISORY COMMITTEE

Charge: To serve as the coordinating committee for Association activities that involve accounting research—specifically:

1. To monitor the accounting research activities of other accounting associations (e.g., AICPA, FEI, IIA and IMA).
2. To advise the director of research in the development and administration of the Association's programs in accounting research, including contributing to effective initiatives undertaken by headquarters' staff involved in faculty development, the regions and the sections.
3. To suggest ways to encourage research in accounting, including research related to discovery, integration, application and teaching.
4. To provide effective research liaison with regions and sections.
5. To coordinate the work of research-designated committees, such as the Competitive Manuscript Committee, the Doctoral Consortium Committee and the Financial Reporting Issues Conference Committee.
6. To work with AEAC to coordinate and implement the Association's faculty program development activity—including:
   a. Coordination of faculty and program development among the Accounting Education Advisory Committee, the Research Advisory Committee, the Webmasters Committee, sponsoring organizations, headquarters' personnel and the director of faculty development.
   b. Evaluation of alternatives to improve the efficiency and effectiveness of processes used in implementing faculty and program development.
   c. Proposal of a detailed budget, in conjunction with the executive director and the director of faculty development, to the Executive Committee and allocate, where authorized, funds specifically designated for this function, including any grants that might be a part of the program.
7. To work with the AEAC, director of faculty development, Regions, Sections and the Program Advisory Committee to suggest and sponsor research-related CPE sessions at national, Regional and Section meetings.

Chair: Joel S. Demski
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Jamie Pratt, Indiana University
Maureen McNichols, Stanford University
Linda McDaniel, University of North Carolina
Charles Lee, Cornell University
Robert Lipe, University of Oklahoma
Mohan Venkatachalam, Stanford University
Shannon Anderson, University of Michigan

RETIRED MEMBERS COMMITTEE
(Formerly the Nontraditional Member Committee)

Charge: To determine the role, dues structure and services that should be offered to retired members of the AAA by:

1. Reviewing the current criteria and determining appropriate criteria and dues for lifetime membership status in the AAA.
2. Determining appropriate AAA services, dues and Annual Meeting costs for retired members.
3. Determining meaningful roles for retired AAA membership to play in the AAA.
4. Working closely with the membership services and subcommittee.
5. Provide an operational plan to the Executive Committee by February 28, 1999.

Chair: Anthony T. Kryztofik
Professor Emeritus
4 Quinlan Drive
Hadley, MA 01035
Phone: (413) 586-3564

Members: Norton Bedford, University of Illinois, Emeritus
Donald Wygal, Rider University
Clayton Hock, Miami University
William Markell, University of Delaware, Retired

SECURITIES AND EXCHANGE COMMISSION LIAISON COMMITTEE

Charge: To conduct activities as appropriate to assist communication and interaction between the SEC and the membership of the Association—specifically:

1. To prepare and transmit a response to the staff of the Securities and Exchange Commission on selected proposals soliciting views from the public concerning auditing and financial accounting and reporting.
2. To make recommendations and to develop program(s) that will assist the teaching of, and conducting research on, topics related to the SEC and its activities.
3. To make recommendations to the Executive Committee for activities that will enhance the quality and quantity of interactions between the SEC and the Association.
4. To keep AAA members, through the use of the Internet or other means, informed of:
    a. Developments of the SEC.
    b. Research opportunities related to SEC work or issues with which they are dealing.
5. To consult with selected regional program chairs early in the academic year to allow for presentations by the SEC Academic Fellow at selected regional meetings, including filing a status report with the Executive Committee by October 31, 1998, February 28, 1999, and July 15, 1999.

Chair: Walter Teets
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Members: Wayne Bremser, Villanova University
Jerry Arnold, University of Southern California
Thomas Weirich, Central Michigan University
Robert Lipe, University of Oklahoma

TECHNOLOGY COORDINATION COMMITTEE

Charge: To consider strategic and tactical issues relating to all aspects of technology as it affects the association. Specifically:

1. To develop a framework and policies to facilitate the planning, coordination and control of electronic dissemination.
2. To identify and prioritize five or six electronic dissemination services that can be delivered to members during the coming year.
3. To ensure that the design, development and delivery of these services occurs as quickly as possible and is based on coordinated decisions that weigh concerns related to faculty development, the Webmasters Committee, the Sections, Regions, and Groups, the administrative functions in Sarasota, the Publications Committee, the Rutgers Accounting web site coordinator and the AAA's strategic plan.

Chair: G. Peter Wilson
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Craig Polhemus, AAA
Bob Sack, University of Virginia
Clinton (Skip) E. White, University of Delaware
Miklos Vasarhelyi, Rutgers University–Newark
Silvia Madeo, University of Missouri–St. Louis

TRUEBLOOD SEMINARS COMMITTEE

Charge: To assist Deloitte & Touche in conducting the Trueblood Seminars—specifically:

1. In conjunction with Deloitte & Touche, to arrange to have the seminars conducted and administered.
2. To report on the results and effectiveness of the seminars and to recommend changes by July 15, 1999.

Chair: Pierre L. Titard
School of Accountancy
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Members: Mark Chain, Deloitte & Touche LLP
Bill Schwartz, Virginia Commonwealth University
Matthew J. Anderson, Michigan State University
Kent St. Pierre, University of Delaware
Marguerite (Peggy) Bishop, University of Pennsylvania
Ralph Welton, Clemson University

VISIONING COMMITTEE

Charge: To examine the current content and structure of accounting education and determine its capability to meet the changing needs of our stakeholders through:

- a. reviewing the report of the 1997–98 Changing Environment Committee;
- b. reviewing the work of other relevant professional committees including the AICPA's visioning project.

1. To develop a vision for the role of accounting education (at all levels) in the broader context of the education of financial management professionals. This vision should be based on input gathered from a wide variety of current and potential constituents.
2. To recommend alternative accounting educational structures to meet stakeholder needs in the next decade.
3. To recommend actions the American Accounting Association can take to work with its members and schools to implement this new vision.
4. To deliver a preliminary report to the Executive Committee by March 1999 and a final report by March 2000.

Co-chairs: To be determined and advised.

WEBMASTERS COMMITTEE

Charge: Coordinate section/region electronic dissemination activities with the AAA webmaster.

1. Assist in refining and implementing plans adopted by the Technology Coordination Committee.
2. Identify areas where existing AAA electronic materials and platforms could be improved and assist in developing plans for improvement.

Chair: Clinton "Skip" White, Jr.
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Monte Swain, Brigham Young University
Rayman Meservy, Brigham Young University
Richard Rand, Tennessee Tech University
Gary Schneider, University of San Diego
Robert Bricker, Case Western Reserve University
Charles Davis, Baylor University
L. Murphy Smith, Texas A&M University
Lola Dudley, Eastern Illinois University
Amelia Baldwin, Florida International University
Ron Huefner, SUNY at Buffalo
Dennis Schmidt, University of Northern Iowa
Cherie O'Neill, University of South Florida
Andrew Priest, Edith Cowan University
Tim Sale, University of Cincinnati

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Required by 39 U.S.C. 3685)

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9. *Full Name and Complete Addresses of Publisher, Editor, and Managing Editor.*

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   Editor: Gerald Salamon, School of Business, Indiana University, Bloomington, IN 47405.

   Managing Editor: Gerald Salamon, School of Business, Indiana University, Bloomington, IN 47405.
10. *Owner (if owned by a corporation, its name and address must be stated and also immediately thereafter the names and addresses of stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.)*

    Name: American Accounting Association (A nonprofit educational association—no stockholders or "owners").

    Address: 5717 Bessie Drive, Sarasota, Florida 34233-2399.
11. *Known Bondholders, Mortgagees, and Other Security Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities:* None
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       2. *Paid or Requested Mail Subscriptions.* Average Number of Copies Each Issue During Preceding 12 Months: 9,465. Actual Number of Copies of Single Issue Published Nearest to Filing Date: 9,575.

    c. *Total Paid and/or Requested Circulation (Sum of 15b(1) and 15b(2)).* Average Number of Copies Each Issue During Preceding 12 Months: 9,465. Actual Number of Copies of Single Issue Published Nearest to Filing Date: 9,575.

    d. *Free Distribution by Mail (Samples, Complimentary, and Other Free).* Average Number of Copies Each Issue During Preceding 12 Months: 50. Actual Number of Copies of Single Issue Published Nearest to Filing Date: 50.

    e. *Free Distribution Outside the Mail (carriers or other means).* Average Number of Copies Each Issue During Preceding 12 Months: 0. Actual Number of Copies of Single Issue Published Nearest to Filing Date: 0.

    f. *Total Free Distribution (sum of 15d and 15e).* Average Number of Copies Each Issue During Preceding 12 Months: 50. Actual Number of Copies of Single Issue Published Nearest to Filing Date: 50.

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       2. *Return from News Agents.* Average Number of Copies Each Issue During Preceding 12 Months: 0. Actual Number of Copies of Single Issue Published Nearest to Filing Date: 0.

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I certify that all information furnished on this form is true and complete.

Craig E. Polhemus, Executive Director

JANUARY 1999 PLACEMENT ADS

The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication. The ***Review*** *is published on the first day of January, April, July and October. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 34233-2399, ATTENTION: ADVERTISING DEPT. All replies to box numbers should be on separate sheets to facilitate forwarding.*

101 OKLAHOMA STATE UNIVERSITY School of Accounting invites applicants for a position at the Associate Professor rank in the Accounting Information Systems area. The appointment will be effective Fall 1999. Candidates should possess the Ph.D. or equivalent, strong quantitative research tools and an interest in research and writing, and be an effective classroom teacher. Professional certification is desirable. The application deadline is February 1, 1999, or until the position is filled. Interested applicants should send resumes and names of references to Lanny G. Chasteen, School of Accounting, College of Business Administration, 401 Business Building, Oklahoma State University, Stillwater, OK 74078-4017. Oklahoma State University is an Equal Employment Opportunity/Affirmative Action Employer.

102 Rice University. The Jesse H. Jones Graduate School of Management at Rice University has an opening in a tenure-track position beginning Fall 1999 and is seeking to fill it with an untenured Assistant/Associate Professor in Accounting. Candidates whose teaching interests are in managerial accounting are preferred. Completion of the Ph.D. by Fall 1999 and evidence of exceptional quality research and teaching are required. The Jones Graduate School awards a Master of Business Administration degree and has approximately 250 full-time and exceptionally talented students. There are currently no undergraduate or doctoral degree programs. Applicants should send a curriculum vita, copies of publications and/or working papers or dissertation proposal to Robert A. Westbrook, Associate Dean for Faculty Affairs, The Jesse H. Jones Graduate School of Management—MS 531, Rice University, PO Box 1892, Houston, TX 77251-1892. Rice University is an Equal Opportunity/Affirmative Action Employer.

103 TRUMAN STATE UNIVERSITY invites applications for a tenure-track accounting faculty position for the 1999–2000 academic year. Applicants are expected to have a Ph.D. or D.B.A. degree with an Accounting Information Systems emphasis (ABDs nearing completion will be considered). Teaching responsibilities include undergraduate and/or graduate accounting courses, primarily accounting information systems. Rank commensurate with experience. Candidates must demonstrate ongoing scholarly activity and potential for excellence in teaching, research, academic advising, and service. With 6,000 students, Truman is Missouri's highly selective public undergraduate liberal arts and sciences university. Send a letter of application, graduate and undergraduate transcripts, and three recent letters of recommendation to Dr. Robert A. Dager, Head, Division of Business and Accountancy, Truman State University, 100 East Normal, Kirksville, MO 63501. Email: bu15@truman.edu. Visit our web site at www.truman.edu. EOE.

104 STATE UNIVERSITY OF NEW YORK AT BUFFALO's (SUNYAB) School of Management expects to have a September 1999 opening for an Assistant Professor of Accounting. We are looking for a candidate with demonstrated interest in and capacity to do research that can be published in leading journals. Capability of teaching Accounting Systems strongly preferred. Familiarity with current educational technology is a plus. Teaching opportunities are at the undergraduate, M.B.A. and Ph.D. levels. Candidates should have an earned doctorate from a reputable research university (or very near completion), a strong interest in research and possess relevant research tools. Candidates with a research track record will be given preference, Salary and fringe benefits are competitive. SUNYAB is an Affirmative Action/Equal Opportunity Employer. Please send resume, two letters of recommendation, a copy of the dissertation proposal and/or any other research paper(s) to Recruiting Coordinator, Department of Accounting and Law, Jacobs Management Center, State University of New York at Buffalo, Buffalo NY 14260-4000.

105 IOWA STATE UNIVERSITY's College of Business is seeking qualified candidates for a tenure-track/tenured full-time faculty position in international business. Applicants will be expected to teach and develop curricular issues related to international business and its relationship to the workplace. In addition, applicants will be expected to teach and conduct research in one of the following related disciplines: international management, international marketing, international operations, international business strategy, international human resource management, international logistics, international finance, and international accounting. Requirements: Ph.D. or D.B.A. in international business or closely related discipline. Rank: Open. Salary: Competitive. Proposed start date: 1/1/99 or 8/16/99. Send resume to Dr. John Wong, Chair of International Business Search Committee, College of Business, 300 Carver Hall, Iowa State University, Ames, IA 50011.

106 STANFORD UNIVERSITY's Graduate School of Business invites applications for two nontenured faculty positions in Accounting effective September 1999. We especially seek candidates interested in Managerial Accounting and areas that will diversify our group's teaching and research portfolio. Candidates must have a Ph.D. or a dissertation in process, and a high level of accomplishment or promise in both scholarly research and graduate-level (M.B.A. and Ph.D.) teaching. Applications should include curriculum vita, copies of research publications, and three confidential letters of reference. Applicants at the Assistant Professor level should also include transcripts from colleges and universities attended. Applications must be forwarded in their entirety to Faculty Recruiting Specialist, Box A, Graduate School of Business, Stanford University, Stanford, CA 94305-5015. Deadline for receipt of materials is January 31, 1999. Stanford University is an Equal Opportunity Employer and seeks applications from women and ethnic minorities.

107 INDIANA UNIVERSITY, Department of Accounting & Information Systems, invites applications for tenure-track faculty positions. We are interested in all subfields of accounting, but are especially interested in filling one position in Auditing. Qualifications include a doctoral degree in Accounting and commitment to excellence in both research and teaching. Applications should be received by February 15, 1999. Especially interested that women and minorities apply. Please forward vita, letters of recommendation, a current working paper, and evidence of teaching excellence to Professor Jamie Pratt, Chair, Department of Accounting & Information Systems, Kelley School of Business, Indiana University, Bloomington, IN 47405. Indiana University is an Affirmative Action/Equal Opportunity Employer.

108 UNIVERSITY OF TEXAS AT AUSTIN, Department of Accounting, College of Business, is recruiting at all academic ranks for positions to begin September 1, 1999. Applicants for the positions of Assistant Professor should be near completion or have completed a Ph.D. or D.B.A. program in business administration or a related field, have superior records in their programs, and have demonstrated potential for excellence in teaching and research. Excellent English communication skills are required. Successful candidates are expected to pursue an active research program, perform graduate and undergraduate teaching, and supervise graduate students.Applicants should submit vita, academic transcripts, references, research proposals and/or samples of research to Dr. Steve Limberg, Chairman, Department of Accounting, CBA 4M.202, University of Texas, Austin, TX 78712-1172. The University of Texas at Austin is an Equal Opportunity Employer.

109 ILLINOIS STATE UNIVERSITY, Department of Accounting houses both accounting and business information systems faculty of the College of Business. The University invites applications for a full-time, tenure-track Assistant Professor position in the Department of Accounting beginning in the fall of 1999. Qualifications include a Ph.D. or D.B.A. in Accounting, a strong commitment to quality teaching, service and research. ABDs will be considered if substantial progress has been made on the dissertation. Preferred qualifications include an interest in working with other accounting and business information systems colleagues to integrate the two disciplines into a new curriculum. To assure full consideration please apply by November 1, 1998. Send letter of application and evidence of qualifications to James E. Moon, Chairperson, Department of Accounting, Campus Box 5520, Illinois State University, Normal, IL 61790-5520. Illinois State University is an Equal Opportunity/Affirmative Action Employer.

110 UNIVERSITY OF CINCINNATI, Department of Accounting and Information Systems, invites applications for tenure-track positions in Accounting beginning Fall 1999, subject to available funding. The rank is open. Our primary needs are in the Taxation, Managerial, and Financial Accounting areas, but all areas will be considered. Minimum qualifications: Ph.D. in Accounting or ABD with a defended dissertation proposal and completion of degree requirements prior to start date. Candidates must show excellence in research and teaching and a commitment to professional service. The College of Business Administration is AACSB accredited at the B.B.A. and M.B.A. degree levels and offers a Ph.D. program. In addition to a B.B.A. in Accounting, M.S.B.A. degrees in Accounting and Taxation are offered. The University has a strong commitment to the principle of diversity and seeks a broad spectrum of candidates. Submit your letter of application, curriculum vita, teaching evaluations, three letters of references, and a working paper and/or defended dissertation proposal to Professor J. Timothy Sale, Chair, Department of Accounting and Information Systems, College of Business Administration, University of Cincinnati, PO Box 210211, Cincinnati, OH 45221-0211. The University of Cincinnati is an Affirmative Action/Equal Opportunity Employer.

111 CORNELL UNIVERSITY. Tenure Track Position in Accounting. The School of Hotel Administration is seeking to fill a tenure-track position in accounting beginning July 1, 1999. Rank is open. Job qualifications: Applicants for this position must have a Ph.D. in Accounting or related field, outstanding research potential (or demonstrated research productivity for non-entry level position) and a strong commitment to excellence in graduate and undergraduate teaching. Primary teaching needs are Financial and Managerial Accounting. Application Procedure: Send a letter of application and curriculum vita to Gordon Potter, Accounting Search Committee, 442 Statler Hall, School of Hotel Administration, Cornell University, Ithaca NY 14853. It is the policy of Cornell University to actively support equality of educational and employment opportunity. The University is committed to the maintenance of affirmative action programs that will assure the continuation of such equality of opportunity.

112 MARIST COLLEGE, School of Management, invites applications for an Assistant Professor of Accounting starting Fall 1999. The accounting program consists of approximately 115 undergraduate majors and a small but congenial faculty. Thus, the ideal candidate will have an interest in teaching a variety of accounting courses. Candidates may pursue any area of specialization. Marist College is a small, liberal arts based institution located on the scenic Hudson River. It places strong emphasis on students and teaching excellence with increasing importance placed on scholarship and research. The School is in its third year of Candidacy Status for AACSB accreditation. A Ph.D. in Accounting is required. Professional certification would be desirable. Applications will be accepted until the position is filled. Please send a current curriculum vita, letter of interest, and contact information for at least three professional references to Dr. Gordon J. Badovick, Dean, School of Management, MPO Box 905/AAA, Marist College, Poughkeepsie, NY 12601.

113 UNIVERSITY OF MARYLAND seeks applicants for a continuing nontenure-track teaching position in Accounting. The position is for nine months beginning Fall 1999. The incumbent will be eligible for a renewable contract, subject to performance. Off term teaching is available. Candidates must possess a doctorate and an excellent teaching record, especially at the Master's level. Teaching breadth (graduate, class size, subject) will be valued. Certain student support and service responsibilities will be expected. Send vita, evidence of teaching effectiveness, and letters of recommendation to Dr. Oliver Kim, Robert H. Smith School of Business, University of Maryland, College Park, MD 20742-1815. The University of Maryland is an Equal/Affirmative Action Employer. Women and minorities are especially encouraged to apply.

114 UNIVERSITY OF MARYLAND AT COLLEGE PARK invites applications for tenure-track faculty positions in accounting at all levels, especially in the areas of Financial Accounting, Auditing, and Accounting Systems, to start in August 1999. Published research (including at the Assistant entry level) commensurate with the level of the appointment is required of all candidates. Please send a vita, three letters of recommendation, and evidence of research to Professor Oliver Kim, The Robert H. Smith School of Business, University of Maryland, College Park, MD 20742. The University of Maryland is an Equal Opportunity/Affirmative Action Employer. Women and minorities are especially encouraged to apply.

115 UNIVERSITY OF MARYLAND UNIVERSITY COLLEGE continually seeks experienced faculty for overseas programs in Asia and Europe (on U.S. military bases), in Irkutsk and Vladivostok, Russia, and in Schwabisch Gmund, Germany. Renewable annual appointments begin January and August 1999. Requirements include a doctorate, two masters, or considerable graduate work beyond the M.B.A.; recent college teaching experience; U.S. citizenship. Excellent for a sabbatical or leave of absence. Benefits include transportation and, where appropriate, military base privileges. Frequent relocation, local living conditions, and the cost of schooling make these positions difficult for those with children. For further information visit our webpage: http://www.umuc.edu under "Faculty/Staff." Send resume to Dr. Rosemary B. Hoffmann, University of Maryland University College, Overseas Programs, College Park, MD 20742-1642 or via email (with mailing address): overseasprograms@admin.umuc.edu. AA/EEO.

116 UNIVERSITY OF NEVADA, LAS VEGAS invites applications for an Assistant Professor position, for which the primary field is Taxation, starting August 1999, contingent upon funding. The position involves teaching at the undergraduate and graduate (M.S. in Accountancy) levels, conducting research leading to publications in refereed journals, and performing service duties. Candidates must have a strong academic record and have demonstrated potential for excellence in both research in their area of specialization and teaching. A doctoral degree in accounting from an AACSB-accredited school is required, but ABDs near completion will be considered. Please send vita, transcripts, and a sample of recent research or defended proposal to Dr. Paulette Tandy, Interim Chair, Department of Accounting, College of Business, University of Nevada, Las Vegas, Las Vegas, NV 89154-6003. For information about UNLV, see www.unlv.edu. Affirmative Action/Equal Opportunity Employer. Minorities, Women, Veterans, and the Disabled are encouraged to apply.

117 UNIVERSITY OF CONNECTICUT. Anticipated accounting faculty opening at the Assistant/Associate level for Fall 1999 at the Storrs campus. This is a tenure-track position. A specialization in Managerial Accounting is desired. Candidates should hold an earned doctorate. For the associate level an established record of research excellence is expected. This position extends the opportunity to teach at the undergraduate, M.S., M.B.A. and Ph.D. levels and engage in research in a supportive environment. The Storrs campus is located in an outstanding rural area, yet is convenient to several major Northeastern cities, including New York and Boston. Prior business experience and ability to interact with the business community are desirable. Contact Richard F. Kochanek, Accounting Department Head, University of Connecticut, U-Box 41A, 368 Fairfield Road, Storrs, CT 06269-2041. We encourage applications from under-represented groups, including minorities, women and people with disabilities.

118 LOUISIANA STATE UNIVERSITY, Department of Accounting in the E. J. Ourso College of Business Administration invites applications for two or more anticipated tenure-track openings to begin August 1999. Applications at the Assistant and Associate rank will be considered for a specialty in Accounting Information Systems. Applications in other specialty areas will also be considered. The positions require that the doctoral degree in Accounting be completed, or near completion, by the date of appointment. If degree is not completed by date of appointment, rank will be at Instructor level. C.P.A. is desired. Faculty are expected to teach undergraduate and graduate courses, be actively involved in academic research, and provide service to the profession and the university. Review of applications will begin September 1, 1998, and will continue until candidates are selected. Please send a letter of application, vita and references to Don W. Finn, Chair, Department of Accounting, 3101 CEBA Building, Louisiana State University, Ref: #006008 & #000314, Baton Rouge, LA 70803.

119 UNIVERSITY OF CALGARY's Faculty of Management invites applications for two positions at the Assistant or Associate Professor levels in all areas of Accounting, with special consideration given to the area of Taxation. Preference will be given to candidates with a completed Doctorate. Research and publication requirements will be commensurate with rank upon appointment. Starting date will be determined by mutual agreement. The Faculty of Management, an AACSB-accredited institution, offers undergraduate, M.B.A. and Ph.D. programs. Specializations include Entrepreneurship, Tourism, and Corporate Environmental Management. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. TheUniversity of Calgary respects, appreciates and encourages diversity. Interested individuals are asked to submit their curriculum vita by April 30, 1999 to Cynthia Simmons, Ph.D.,Chairman, Accounting, Faculty of Management, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4; Fax: (403) 282-0095.

120 CORNELL UNIVERSITY, Johnson Graduate School of Management. Assistant, Associate or Full Professor of Accounting. Responsible for teaching basic and advanced courses in Accounting at the Master's level; research in area(s) of expertise and interests; supervision of doctoral candidates; and interdisciplinary contribution to the research and teaching of other faculty members. Direct inquires to Professor Charles M. C. Lee, S. C. Johnson Graduate School of Management, 319 Sage Hall, Cornell University, Ithaca, NY 14853-6201. Applicants should have completed a doctorate or be at the dissertation stage of a doctoral program. Applications should include a vita, together with a dissertation proposal or abstract, and copies of research papers. An Affirmative Action/Equal Opportunity Employer.

121 UNIVERSITY OF NEBRASKA–LINCOLN, School of Accountancy invites applications for the Deloitte & Touche Professorship at the Associate or Full Professor rank. The School seeks an individual who will provide leadership in research, collaboration with colleagues and doctoral students, and teaching (preferably Financial Accounting) at the undergraduate and graduate levels. Applicants in all areas with a demonstrated record of research and teaching and a promise of significant future contributions are encouraged to apply. The appointment will begin Fall 1999. Salary is competitive and commensurate with qualifications. Initial screening of candidates will begin December 15, 1998 and will continue until the position is filled. The University of Nebraska–Lincoln is committed to a pluralistic campus community and is responsive to the needs of dual career couples. Inquiries and applications should be directed to Professor Linda Ruchala, College of Business Administration, University of Nebraska–Lincoln, Lincoln, NE 68588-0488; Phone:(402) 472-8812; Email: lruchala1@unl.edu. Please also see our web site: http://www.cba.unl.edu/accvacancy.html.

122 PLATTSBURGH STATE UNIVERSITY OF NEW YORK invites applications for a tenure-track faculty position in the Department of Accounting at the Assistant Professor rank starting Spring or Fall 1999. Applicants must have a doctoral degree (or near completion) in Accounting from an AACSB-accredited school. CPA, CMA and other certifications desired. Required qualifications include a commitment to teaching excellence, understanding of and sensitivity to minority and gender concerns, ability to publish high-quality research. Primary teaching interest should include Accounting Information Systems. Please send letter of application, curriculum vita, names and addresses of three references to Chair, Department of Accounting Search Committee (PJ#2210-AAA), c/o Personnel Office, Plattsburgh State University of New York, 101 Broad Street, Plattsburgh, NY 12901-2681. Females and racial minorities encouraged to apply. Review of applications starts on November 15, 1998 until position is filled.

123 SOUTHERN CONNECTICUT STATE UNIVERSITY invites applications for a tenure-track position at the Assistant or Associate Professor level beginning Fall 1999. The successful candidate should possess the ability and desire to teach in at least two of the three following areas: Managerial Accounting, Accounting Information Systems, and International Accounting. Industry experience and a CMA are desired. A Ph.D. or D.B.A. in Accounting is required, although ABDs nearing completion will be considered. Salary and rank are competitive and depend upon qualifications and prior experience. Candidates should submit their resumes, along with three letters of recommendation, by March 1, 1999 to Dr. Carey C. Curtis, Chair of the Search Committee, Accounting Department, SCSU, 501 Crescent Street, New Haven, CT 06515. SCSU is an Affirmative Action/Equal Opportunity Employer and strongly encourages minorities and women to apply.

124 UNIVERSITY OF MASSACHUSETTS BOSTON, Accounting and Finance Department of the College of Management is seeking applicants for Accounting faculty position. Candidates should hold a Ph.D. or D.B.A. in Accounting; ABDs nearing completion will also be considered. Rank and salary are dependent on qualifications. CPA, CMA or CIA would be a plus. The College offers undergraduate and M.B.A. programs, and emphasizes quality instruction and research. Salary, teaching load and other benefits are very competitive. Send resume to Dr. Lal C. Chugh, Chairman, Department of Accounting and Finance, College of Management, University of Massachusetts Boston, 100 Morrissey Blvd., Boston, MA 02125-3393. An Affirmative Action Equal Opportunity, Title IX employer. Position subject to funding.

125 MIDDLE TENNESSEE STATE UNIVERSITY Department of Accounting invites applications for two tenure-track faculty positions at the Assistant Professor rank, beginning August 1999, contingent on funding. Candidates should possess an earned doctorate in accounting or expect to complete degree requirements within one year of appointment. Professional certification is highly desirable. One position requires an interest in teaching Tax (position # 110130); the other position (position # 110200) requires a teaching interest in either Financial or Managerial Accounting. Applicants should have a strong commitment to excellence in teaching, research and publication, and service. The Department offers a B.B.A. in Accounting, an M.S. in Accounting/Information Systems, and supports the M.B.A. accounting concentration. Review of applications begins November 16, 1998 and will continue until positions are filled. Submit application letter, resume, transcripts, and three letters of reference to Dr. Paula B. Thomas, Search Committee Chair, MTSU Box 50, Murfreesboro, TN 37132. An EO/AA/ADA/Employer.

126 YALE UNIVERSITY's Graduate School of Management is seeking additional faculty members at the junior and senior levels in the area of Accounting. Ph.D. or equivalent is required; research and teaching interest in theory and application preferred, as well as an interdisciplinary orientation. Appointments will be made for the 1999–2000 academic year. Please send curriculum vita, letters of recommendation, and samples of scholarly work by March 31, 1999, to Office of the Dean, Faculty Recruiting, Yale School of Management, Box 208200, New Haven, CT 06520-8200. Yale is an Equal Opportunity, Affirmative Action Employer and especially encourages applications from women and members of minority groups.

127 UNIVERSITY OF HARTFORD's Department of Accounting and Taxation invites applications for two tenure-track positions at the Assistant Professor rank starting Fall 1999. One position will emphasize Managerial Accounting and the other will emphasize Financial. A secondary teaching emphasis is welcomed, especially in the areas of Systems and Auditing. Teaching effectiveness is emphasized with scholarly activity expected. The ideal candidate will have completed requirements for a Ph.D. or D.B.A. with concentration in Accounting. Professional experience and CPA/CMA are positive additional factors. Send letter of application and vita to Dr. John Ogilvie, Associate Dean, Barney School of Business and Public Administration, University of Hartford, 200 Bloomfield Avenue, West Hartford, CT 06117. The University of Hartford is an EEO/AA employer and especially welcomes applications from ethnic minorities and women. Review of materials will begin immediately and continue until positions are filled.

128 UNIVERSITY OF ILLINOIS AT CHICAGO's Department of Accounting is taking applications for positions of Assistant or Associate Professor of Accounting. Applicants at the Assistant level should possess a Ph.D. or have an anticipated completion date of August 1999. All applicants must exhibit a capacity to produce quality research and a commitment to teaching excellence. Responsibilities include research and undergraduate/graduate teaching generally six hours (two courses) per semester. Closing date for applications is February 15, 1999 although that date may be extended. Starting date is August 1999. UIC is one of 70 Research I universities in the country. Further information about the university can be seen at http://accounting-net.actg.uic.edu/. Send vita and three reference letters to Ram T. S. Ramakrishnan, Department of Accounting (m/c 006), College of Business Administration, University of Illinois at Chicago, 601 S. Morgan, Chicago, IL 60607. The University of Illinois at Chicago is an Affirmative Action/Equal Opportunity Employer.

129 SYRACUSE UNIVERSITY's School of Management invites applications for a tenure-track position at the Assistant or Associate Professor rank. Candidates who desire to teach in the Financial Accounting area or in the Taxation area are encouraged to apply. The successful applicant is expected to contribute to our undergraduate, Master's and Ph.D. Accounting programs. Applicants at the Assistant Professor level must possess a Ph.D. in Accounting and must provide evidence of strong research and teaching abilities. Applicants at the Associate Professor level must have an established record of published research and strong teaching credentials. Candidates should demonstrate an interest in the School's themes: entrepreneurship, global management, leadership and technology management. Salary and benefits are commensurate with qualifications. Resumes are accepted until the position is filled but priority is given to applications received by December 31, 1998. Apply to Gerald Lobo, School of Management, Syracuse University, Syracuse, NY 13244. Syracuse University is an Equal Opportunity/Affirmative Action Employer.

130 ELIZABETHTOWN COLLEGE. Assistant or Associate Professor. Tenure-track position starting Fall 1999. Applicants should have doctorate by Fall 1999, evidence of teaching excellence, dedication to student professional development and committed to scholarship. Teaching responsibilities would include Tax (Federal and State) and Financial Accounting. CPA required. Department of Business is accredited by the Association of Collegiate Business Schools and Programs and offers baccalaureate degrees in Accounting, Business Administration, Economics, and International Business. Elizabethtown College, rated one of the best northern liberal arts institutions by U.S. News and World Report, has 1,525 students (250 in Business Department) and 38 major programs in liberal arts and professional fields. Located in Pennsylvania's historic Lancaster County. From Elizabethtown, there is easy access to major metropolitan areas including Philadelphia, Washington and Baltimore. Send letter of application, resume, and names and contact information of three current references to Nancy Florey, Director of Human Resources, One Alpha Drive, Elizabethtown, PA 17022. AA/EO.

131 UNIVERSITY OF ARKANSAS AT LITTLE ROCK (www.ualr.edu) invites applications for a tenure-track position as Chair of the Department of Accounting at the Associate/Professor level effective July 1, 1999. Candidates must have a doctorate from an AACSB-accredited university with a concentration in Accounting and provide evidence of effective teaching and publications or have extensive experience in upper management in the accounting profession. Professional accounting certification and tenure at a previous institution are also strongly desired. Applicants should submit credentials by January 31, 1999, to Dr. Robert B. Mitchell, Department of Management, University of Arkansas at Little Rock, 2801 South University, Little Rock, AR 72204; Email: rbmitchell@ualr.edu; Phone: (501) 569.3383. The vita should provide the names of at least three references and procedures for contacting them. Official transcripts will be required upon employment. AA/EEO. The College of Business Administration is AACSB-accredited at the undergraduate and graduate levels.

132 UNIVERSITY OF WESTERN ONTARIO's Richard Ivey School of Business, an internationally recognized business school, seeks candidates for a probationary tenure-track or limited-term position at the level of Assistant or Associate Professor in the area of Management Accounting and Control. The position is available to begin in September 1999. The successful candidate will demonstrate a strong commitment to the practice of management in both research and teaching. This position is subject to budget approval. In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and Permanent Residents of Canada. The Richard Ivey School of Business and the University of Western Ontario are committed to employment equity, welcome diversity in the workplace, and encourage applications from all qualified individuals including women, members of visible minorities, Aboriginal persons and persons with disabilities. Contact Professor Sarah Mavrinac (519) 661-3305 or smavrinac@ivey.uwo.ca.

133 UNIVERSITY OF KENTUCKY seeks a highly-qualified individual to assume the position of Endowed Professor of Accounting and Director of the School of Accountancy. The new Director is expected to work with faculty to continuously improve all academic and research programs and enhance the service programs of the School. The School of Accountancy consists of 18 faculty members and offers undergraduate and masters' programs in Accounting and a Ph.D. in Business Administration with a major in Accountancy. The University of Kentucky is the flagship university of the state and the School of Accountancy enjoys outstanding support from alumni and the business community. Nominations and/or applications, with vita, should be sent to Dr. Thomas R. Pope, Chair of the School of Accountancy Director Search Committee, 345H Gatton College of Business and Economics, University of Kentucky, Lexington, KY 40506-0034. Email: tpope@pop.uky.edu; Fax: (606) 257-3654. The University of Kentucky is an Equal Opportunity, Equal Access, Affirmative Action Employer.

134 LONDON BUSINESS SCHOOL seeks applications for both permanent and visiting positions in the accounting department. All levels of appointment and all areas of accounting will be considered. Applicants at the junior level should hold or be close to completion of a Ph.D. Demonstrated ability or potential for effective teaching and quality research are important considerations. Candidates at the senior levels should have an established international reputation, an excellent publications record and strong teaching capabilities. We are interested in candidates who can interact effectively with others and enhance the intellectual environment of the school. London Business School is a graduate school of the University of London. It is a highly international school with close links to London's financial community. Interested persons should send a curriculum vita, reference letters, teaching evaluations and research papers or publications to Professor Chris Higson, London Business School, Regent's Park, London NW1 4SA, U.K.

135 OTTERBEIN COLLEGE. A tenure-track position at the Assistant or Associate level for Fall 1999. A Ph.D. is required. ABD candidates will be considered if completion of dissertation is imminent. Preference will be given to individuals with prior teaching experience at the M.B.A. level and who have an ability to teach in a number of accounting areas. Candidate will teach seven courses per academic year (quarter system). These will include courses in the undergraduate program as well as M.B.A. courses in Accounting. Send application letter, resume, and three letters of recommendation to Dr. Patricia A. Frick, VP Academic Affairs, Otterbein College, Westerville, OH 43081. Deadline: March 1, 1999. Web page: http://www.otterbein.edu. AA/EOE. Women and minorities are encouraged to apply.

136 SAVANNAH STATE UNIVERSITY, a unit of the University System of Georgia, has tenure-track positions open in the College of Business Administration to begin Fall 1999. Applicants are invited for the following position in the College of Business Administration. Rank and salary will be commensurate with education and experience. Accounting–Assistant/Associate Professor: The applicant must have a Ph.D. with a concentration in accounting. Consideration will be given to those who are ABD within a year of completion. We need a candidate who can teach Cost/Managerial and Not-For-Profit Accounting. The possession of accounting certification is desirable but not necessary. Applicants should provide evidence of research potential and quality teaching ability. Application process: Submit letter of application with a current curriculum vita, all official graduate transcripts, and three letters of reference to the following address postmarked by November 25, 1998. Office of Human Resources, PO Box 20601, Colston Administration Building, Room 120, Savannah State University, Savannah, GA 31404. EEO/AA.

137 WESTERN MICHIGAN UNIVERSITY invites applications for two tenure-track positions in the Department of Accountancy at the rank of Assistant Professor beginning Fall 1999. Candidates for the first position should have a primary teaching interest in Accounting Information Systems and secondary interest in Financial or Managerial Accounting. The second position is an International position for someone fully specialized in a region outside the United States. Full specialization implies graduate study of a specific area of the world, proficiency in the language(s) of that region, and experience residing in that region. Secondary teaching interests may be in any area except Auditing or Tax. Candidates must have a Ph.D. with an accounting major or expect completion of the Ph.D. by the fall of 1999. Address applications to Professor Roger Tang, Haworth College of Business, Department of Accountancy, Western Michigan University, Kalamazoo, Michigan 49008-3805. Western Michigan University is an Affirmative Action/Equal Opportunity Employer.

138 UNIVERSITY OF CENTRAL FLORIDA School of Accounting invites applications and nomination for the KPMG Professorship in Accounting at the rank of Professor or Associate Professor. Candidates must have an earned doctorate and an outstanding record of research, teaching and service in Accounting. Preference will be given to individuals with experience in the delivery of doctoral education. CPA certification is desirable. Screening on nominations will begin on January 15, 1999. Applications will be accepted until the position is filled. Anticipated starting date is Fall 1999. Nominations and applications for this position should be sent to Dr. Andrew J. Judd, Director, School of Accounting, PO Box 161400, University of Central Florida, Orlando, FL 32816-1400. Applications must include a letter of interest, curriculum vita, and the names of three references. AA/EEO.

139 LONG ISLAND UNIVERSITY—C.W. POST CAMPUS, College of Management, School of Professional Accountancy is seeking applications for a tenure-track position at the Assistant or Associate Professor level, beginning Fall 1999. The successful candidate should have a primary teaching interest in the area of Accounting Information Systems and a Ph.D. or D.B.A. in Accounting or Information Systems. Professional certification (CPA or CMA) and the ability to interact with the professional community are desirable. Salary and benefits are competitive and commensurate with professional qualifications. Review of applications will begin February 1, 1999 and will continue until the position is filled. A letter of application and a current curriculum vita should be sent to Dr. Lawrence Kalbers, Chair, Personnel Committee, School of Professional Accountancy, Long Island University—C.W. Post Campus, 720 Northern Boulevard, Brookville, NY 11548-1300. Long Island University—C. W. Post is an Equal Opportunity Educator and Employer.

140 POSITION WANTED: Preferably, Associate Professor for Fall 1999 Financial Accounting and/or Taxation program with AACSB (or on track for it) accredited nondoctoral-granting business/accounting program. Geographical preference: Midwest, Southeast, Mid-Atlantic. Respond to box number or email: cpaprof@home.net. Excellent teacher and faculty member devoted to student learning and success. Ph.D. (major in Accounting/minor in Taxation), CPA, CMA, 15 years undergraduate teaching (primarily Intermediate Accounting, Individual/Corporate/Partnership Taxation; have taught Governmental, Managerial, and Auditing), five years public accounting. Good publication and teaching record and active in serving as reviewer/discussant for AAA regional meetings and service within the AAA/ATA and state CPA society.

141 UNIVERSITY OF SASKATCHEWAN is seeking applications for a tenure-track or visiting position in Managerial Accounting at any rank beginning July 1999. Applicants should possess a relevant doctorate or be in the final stages of completion. A commitment to teaching excellence and quality publications is required. Three degree programs in Accounting are offered: bachelors, a research-based Master's, and a professionally oriented Masters. In 1999, a new building providing state of the art teaching facilities will be available. The city of Saskatoon, population 205,000, offers an abundance of parks, recreational and cultural activities, and close proximity to pristine lakes and a national park. The University is committed to the principles of employment equity. Qualified women are especially encouraged to apply. Applicants should submit a resume, three letters of reference, examples of research, and teaching evaluations to R. M. Lindsay, Department of Accounting, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, S7N 5A7.

142 UNIVERSITY OF CALIFORNIA, IRVINE, Graduate School of Management seeks candidates for a tenure-track Assistant or Associate Professor of Accounting beginning July 1, 1999. Candidates must have or be in the final stages of a Ph.D. and be committed to research and M.B.A. teaching. Associate Professor candidates should have an established research record. Preference given to candidates able to teach Tax and Financial Accounting, although all areas will be considered. Salaries commensurate with experience. Applicants should submit their dissertation proposal, c.v., letters of recommendation, publications, papers and teaching evaluations to Professor William F. Wright, Graduate School of Management, University of California, Irvine, CA 92697–3125. Under federal law, the University of California may employ only individuals who are legally authorized to work in the United States as established by providing documents specified in the Immigration Reform and Control Act of 1986. UCI is an Equal Opportunity Employer committed to excellence through diversity.

143 AMERICAN UNIVERSITY, Kogod College of Business Administration. Senior Accounting Faculty Position. The Kogod College of Business Administration invites applications for a senior tenure-track position in Accounting, effective Fall 1999. The position is open rank with the intention of attracting a scholar with an established record of high quality publication and a genuine interest in serving as mentor to junior faculty and strengthening the intellectual contributions of the accounting faculty. Candidates are expected to provide evidence of high quality teaching ability and a commitment to professional accounting education. Professional certification and experience are highly valued. Rank and compensation will be commensurate with qualifications. The College's programs have AACSB business and accounting accreditation. Candidates should send a letter of application, vita, three letters of recommendation, and copies of teaching evaluations to Myron Roomkin, Dean, Chair, Accounting Search Committee, Kogod College of Business Administration, 4400 Massachusetts Avenue, NW, Washington, D.C. 20016-8044. Equal Opportunity Employer.

144 UNIVERSITY OF MINNESOTA's Department of Accounting is seeking applications for one full time, tenure-track faculty position at the Assistant Professor or untenured Associate level. Applicants must either have an earned doctorate or be in an advanced stage of doctoral work. If degree is not in hand by the starting date for the appointment, individual will be appointed as a Teaching Specialist. All applicants must have a strong commitment to accounting research and teaching. Responsibilities include teaching (undergraduate, M.B.A., and doctoral levels), research and service. Applications should include a curriculum vita, samples of scholarly work, and at least two letters of recommendation from faculty who are familiar with their research. Send all materials to Professor Arijit Mukherji, Chair, Search Committee, Department of Accounting, Curtis L. Carlson School of Management, University of Minnesota, 321-19th Avenue South, Minneapolis, MN 55455. The deadline for the receipt of materials is February 1, 1999. The University of Minnesota is an Equal Opportunity Educator and Employer.

145 UNIVERSITY OF ALBERTA. Applications are invited for a full time, tenure-track position in Accounting, subject to funding beginning July 1, 1999. Ph.D. or equivalent required. Salary and rank (Assistant/Associate Professor level) depend on experience and qualifications. Candidate with research and teaching interests in Managerial Accounting are especially sought. Competition remains open until the position is filled. Send resumes to James C. Gaa, Chair, Department of Accounting & MIS, Faculty of Business, University of Alberta, Edmonton, Alberta, Canada, T6G 2R6. The University of Alberta is committed to the principle of equity in employment. As an employer, we welcome diversity in the workplace and encourage applications from all qualified women and men, including Aboriginal peoples, persons with disabilities, and members of visible minorities.

146 QUEENS COLLEGE–CITY UNIVERSITY OF NEW YORK, Department of Accounting and Information Systems invites applications for a tenure-track professorial position starting Fall 1999 to teach graduate and/or undergraduate courses in Auditing, Financial Accounting, Managerial Accounting, Accounting Information Systems, Microcomputer Applications, and Seminars in Theory and Research. Doctorate required by starting date with record of evidence of commitment to teaching and research. Salary and rank commensurate with experience. Excellent benefits are included. To apply, send letter of application, curriculum vita, three reference letters and transcript by March 31, 1998 to Professor Marvin F. Milich, Chair, Search Committee, Department of Accounting and Information Systems, Queens College, Flushing, NY, 11367-1597. AA/EOE/ADA.

147 VIRGINIA TECH, Department of Accounting and Information Systems invites applications for a tenure-track faculty position at the rank of Assistant Professor beginning August 10, 1999. Applicant's primary research and teaching interests should be in either Financial or Managerial Accounting. Successful candidate will instruct M.B.A. students in accounting courses at the Virginia Tech Graduate Center located in Falls Church, Virginia (a suburb of Washington, D.C.). Qualifications: Doctoral requirements completed and applicants should present demonstrable prospects for conducting scholarly research and excellence in teaching. Applications will be accepted until January 15, 1999, or until the position is filled. Applications and nominations should be sent to Wayne E. Leininger, Department of Accounting and Information Systems, 3007 Pamplin Hall (0101), Virginia Tech, Blacksburg, VA 24061. Virginia Tech is an Equal Opportunity/Affirmative Action Employer. Additional information about Virginia Tech (http://www.vt.edu/) and the Department (http://acctserver.cob.vt.edu/) can be obtained from our home page.

148 UNIVERSITY OF ALASKA FAIRBANKS invites applications for a tenure-track position in our AACSB-accredited accounting program, starting August 1999, at the rank of Assistant Professor. Applicants with primary interest in the Auditing Area and demonstrated excellence in teaching and research are urged to apply. A secondary interest in either Financial Accounting or Information Systems is desirable. Applicants should possess a Ph.D./DBA (or ABD) by August 1999. CPA/CA/CIA/CMA/CFM certification is desirable. Anticipated schedule of five classes per year. Salary is AACSB competitive. Job is open until filled. Send resume, graduate transcripts, and three letters of reference to Dr. Hank Wichmann, Head, Accounting & Information Systems (AIS) Department, School of Management, University of Alaska Fairbanks, PO Box 756080, Fairbanks, AK 99775-6080. UAF is an Equal Opportunity, Affirmative Action Employer. Visit the UAF Web site at http://www.som.uaf.edu.

149 OHIO UNIVERSITY's School of Accountancy invites applications for the position of Director. Duties of the Director include academic leadership, cultivating external relationships, and representing the School of Accountancy internally. The Director will hire, evaluate, counsel, schedule, and assist a full time faculty of 11 to 13 people. The Director will teach one course per quarter and continue to be actively engaged in a research program. Prior experience and publications should be sufficient for appointment at the level of Professor. Ohio University's College of Business is accredited by the AACSB and the School of Accountancy is also separately accredited. Interested parties should send an inquiry letter and resume to R. Budd Werner, Director, School of Accountancy, Copeland Hall, Ohio University, Athens, OH 45701. Ohio University is an Equal Opportunity Employer. Women, minorities and individuals with disabilities are encouraged to apply.

150 OHIO UNIVERSITY's School of Accountancy is accepting applications for two positions as follows: Associate Professor of Accounting: Ph.D. degree required; professional license(s) are desired; publications are necessary for appointment at this level. Assistant Professor of Accounting: Doctoral candidates expecting to complete their programs by Summer 1999 are encouraged to apply. Specialization may be in any area. One person with expertise in Systems will be hired. Ohio University's College of Business is accredited by the AACSB and the School of Accountancy is also separately accredited. The University is located in rural southeast Ohio, approximately 75 miles from Columbus, on a beautiful campus. Interested parties are requested to send an inquiry letter and resume to R. Budd Werner, Director, School of Accountancy, Copeland Hall, Ohio University, Athens, OH 45701. Ohio University is an Equal Opportunity Employer. Women, minorities and individuals with disabilities are encouraged to apply.

151 ROCHESTER INSTITUTE OF TECHNOLOGY invites applications for a junior and a senior tenure-track position in Accounting starting in Fall 1999. The department seeks candidates with research and teaching interest in the Managerial, Financial or Tax areas. Rank will depend upon qualifications and experience. The College of Business is AACSB accredited with 700 undergraduates and 500 graduate students. Nominations and applications will be accepted until these positions are filled. Address nominations, applications and inquiries to Faculty Searches, Office of the Dean, College of Business, RIT, Rochester, NY 14623-5608. RIT is an EEO employer and encourages applications from minorities and women.

152 UNIVERSITY OF SOUTHERN CALIFORNIA, Leventhal School of Accounting, is seeking candidates to fill two tenure-track positions at the Assistant, Associate or Full Professor levels for Fall 1999. Candidates for Assistant Professor should have a doctorate in hand or be near completion of the dissertation. All candidates should have excellent teaching ability and a strong commitment to scholarly research. Priority for one of the positions will be given to candidates with a strong background in and a desire to do both research and teaching in enterprise resource-planning systems, process reengineering (particularly financial processes) and financial databases and/or data warehouses. The University of Southern California is an Equal Opportunity, Affirmative Action Employer; applications are encouraged from women and minority candidates. Please contact Professor Daniel E. O'Leary, Leventhal School of Accounting, University of Southern California, Los Angeles, CA 90089-1421.

153 MCGILL UNIVERSITY, Faculty of Management, Montreal, is seeking tenure-stream faculty in Accounting, at the Assistant, Associate or Full Professor level, for August 1, 1999. Preferred candidates will be qualified to teach Financial or Management Accounting. Candidates must possess a completed doctorate or be close to completion. Commitment to excellence in relevant research and proven record of commitment to teaching is necessary. Professional qualification (CA/CPA or CMA) is desirable. Salary and benefits are competitive. The Faculty of Management offers the B.Com, M.B.A., and Ph.D. degrees, and in keeping with the University's student body, it has the most international faculty of any business school in North America. Please send curriculum vita to Professor C. S. McWatters, Faculty of Management, McGill University, Montreal, Quebec, Canada H3A 1G5.

Business

McMaster University, Faculty of Business.

The Michael G. DeGroote School of Business invites applications for one tenure-track position at the Assistant Professor level, commencing July/September 1999, in the following areas:

> One position is available in the areas of Advanced Financial Accounting, Auditing and Accounting Information Systems

One's Ph.D. should be completed by the commencement of the appointment, preferably with demonstrated excellence in teaching and research. Breadth in teaching capabilities is a distinct advantage. Duties include research (McMaster is a "research intensive university") and teaching at both the graduate and undergraduate levels. Salary will be commensurate with academic qualifications, teaching and practical experience.

Applications which should contain a CV and names of at least three references, should be mailed to:

Dr. David W. Conrath, Dean
Michael G. DeGroote School of Business
McMaster University
Hamilton, ON L8S 4M4
(email address:<conrathd@mcmaster.ca>)

McMaster University is committed to employment equity and encourages applications from all qualified candidates including: aboriginal peoples, persons with disabilities, members of visible minorities and women. In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and permanent residents.

Applications will be considered until the positions are filled, but it is strongly recommended that they arrive no later than December 31, 1998.

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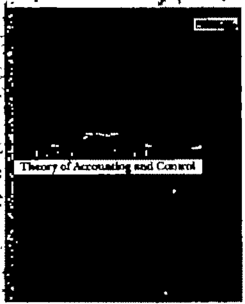

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The City University of Hong Kong (CityU) is positioned to be a leading university in the Asia-Pacific region. CityU is located in close proximity to the hub of all business activities in Hong Kong with convenient access through the mass transit railway. The University has a student population of approximately 18,500 and offers first class facilities with generous teaching and research support. All faculty in the CityU is committed to excellence in teaching and research as well as to maintaining close ties with commerce and industry. The medium of instruction will continue to be in English given that Hong Kong has a significant role to play as an international city. Amongst the faculties/schools, the Faculty of Business is proud to be the largest business school in Hong Kong with a total of about 140 faculty members within its six departments. All six departments are well known in the business community for their professional standing and academic reputation.

The Department of Accountancy is one of the six departments in the Faculty of Business. It has 30 full time faculty members and 7 administrative staff. Two honorary research professors namely **Professor Ross Watts**, Rochester Telephone Corporation Professor, William E Simon Graduate School of Business Administration, University of Rochester and **Professor Tang Yun Wei**, President of Shanghai University of Finance and Economics, have been appointed for a period of three years to augment the research profile of the department. Our department provides state-of-the-art accountancy education with a professional emphasis. We offer one undergraduate programme namely the Bachelor of Business Administration (Honours) in Accountancy and three taught postgraduate programmes including Master of Arts in International Accounting, Postgraduate Diploma in Professional Accounting and Postgraduate Diploma in Corporate Administration. Two unique undergraduate degrees namely Bachelor of Business Administration (Honours) in **Accountancy and Management Information Systems** & Bachelor of Business Administration (Honours) in **Accountancy and Law** will commence 1999 – 2000. Our Bachelor of Business Administration (Honours) in Accountancy has been accredited by the Hong Kong Society of Accountants for their new Professional Examination Scheme.

Research is strongly and actively encouraged and we have been successful in obtaining numerous competitive research grants both within and outside the University. The Department is further strengthening its PhD programme and its research in economic aspects of accounting and auditing, with special interest in the Chinese Mainland and the Asia-Pacific region. Research seminars with eminent professors from well-known universities have become part of our regular activities. Our excellent track record in internationally refereed publications such as ***The Accounting Review, Journal of Accounting and Economics, Accounting, Organizations and Society, Auditing: A Journal of Practice and Theory, Journal of Corporate Finance, Journal of Accounting and Public Policy*** to name a few, are evidence of our research strength.

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Department of Accountancy

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Residual Earnings Valuation With Risk and Stochastic Interest Rates

Gerald A. Feltham
University of British Columbia
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ABSTRACT: This paper provides a general version of the accounting-based valuation model that equates the market value of a firm's equity to book value plus the present value of expected abnormal earnings. Prior theoretical work (e.g., Ohlson 1995; Feltham and Ohlson 1995, 1996) assumes investors are risk neutral and interest rates are nonstochastic and flat. Our more general analysis rests on only two assumptions: no arbitrage in financial markets and clean surplus accounting. These assumptions imply a risk-adjusted formula for the present value of expected abnormal earnings. The risk adjustments consist of certainty-equivalent reductions of expected abnormal earnings. A key issue deals with the capital charge component of abnormal earnings. It is measured by applying the (uncertain) riskless spot interest rate to start-of-period book value. Risks do not affect the rate used in the capital charge, and accounting policies do not affect the formula's constructs. An application of the general formula shows how the classic risk-adjusted expected cash flows model derives as a special case.

Key Words: *No arbitrage, Clean surplus accounting, Valuation, Abnormal earnings, Cash flows.*

I. INTRODUCTION AND SUMMARY

Many recent papers apply the clean surplus relation to express a firm's market value as book value plus the present value of expected abnormal (or residual) earnings (see, for example, Ohlson 1995; Feltham and Ohlson 1995, 1996). Though the derivations of this accounting-based valuation formula admit uncertainty, prior research has

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not dealt with risk, except possibly as an *ad hoc* adjustment to the discount factor.[1] Risk neutrality is commonly used to completely avoid the issue of how risk is priced. Another standard simplification relates to the use of a single discount factor applied to all future periods in a geometric fashion. This approach lacks theoretical foundation if interest rates evolve stochastically or if the term-structure is not flat. Removal of these stringent assumptions opens up the question of how one adjusts for risk and measures the capital-charge component of abnormal earnings. This paper extends the theoretical structure to derive a general version of the formula. We show how one adjusts the formula for risk, deals with stochastic interest rates, identifies the discount factors and, not the least, measures the capital-charge component of abnormal earnings. The settings and concepts upon which we rely integrate with the foundations of modern finance theory.

Consistent with basic finance theory, our analysis begins with a general version of the relation between market values and anticipated event/date contingent dividends. Given no arbitrage opportunities in perfect markets, a firm's market value can be equated to dividends multiplied by event/date contingent prices and summed over all conceivable events and dates. Such economy-wide contingent prices always exist given no arbitrage and mild neoclassical regularity conditions (see Rubinstein 1976; Huang and Litzenberger 1988; Dothan 1990; Duffie 1996). Transforming this representation yields an equivalent expression such that value equals the present value of expected dividends adjusted for their risks across future dates. The risk adjustments for the expected dividends depend on how dividends correlate with general economic factors such as the return on the market-portfolio (in the CAPM setting). Further, the current term-structure of interest rates determines the discounting of the certainty-equivalent expected dividends.

With the generalized present value of dividends formula in place, one can proceed to generalize the accounting-based valuation formula. The accounting for future events is assumed to satisfy the clean surplus relation. We then show that the resulting valuation formula has the following properties. First, one adjusts expected abnormal earnings for their risks by deducting terms that depend on how abnormal earnings correlate with the economy-wide factors that determine risk in general. Second, the discount factors are determined by the term-structure of interest rates at the time of the valuation—and that term-structure can be nonflat. This aspect of the generalized accounting-based valuation formula parallels the generalized present value of the expected dividends formula. Third, the capital-charge components of abnormal earnings equal the riskless spot interest rates times the related start-of-period book values. The future spot rates are uncertain, but the formula embeds that uncertainty.

The generalized formula builds in some not-so-obvious features and their appreciation requires careful model development. A key result shows that no arbitrage in dividends is equivalent to no arbitrage in current book value and anticipated abnormal earnings. Nevertheless, accounting measurements play no particular role. This measurement irrelevance is the more surprising because the risk adjustments depend on how abnormal earnings correlate with economy-wide, risk-inducing factors. Further, risk adjustments do *not* affect the capital-charge components of abnormal earnings, because the latter depend only on future, event-contingent, spot interest rates combined with the related book values.

---

[1] Most of the early papers that consider the discounting of abnormal earnings do not explicitly model uncertainty (e.g., Preinreich 1937; Edey 1957; Edwards and Bell 1964). Peasnell (1981, 1982) considers a nonflat, nonstochastic term-structure of interest and uses a risk-adjusted cost of capital applied to expected abnormal earnings. Peasnell (1982) provides a simple three-period example with state-dependent outcomes; to permit application of a single-period CAPM model, he assumes all uncertainty is resolved at the end of the first period. Stark (1986) presents a two-period capital budgeting example in which he develops a risk-adjusted cost of capital for each period using Fama's (1977) CAPM approach (assuming a flat, nonstochastic, term-structure of interest). Peasnell's (1981, 1982) and Stark's (1986) handling of risk is illustrative, but their approaches are appropriate only under highly restrictive assumptions and cannot be viewed as general. Stark (1986) criticizes valuation approaches that apply a risk-adjusted cost of capital to expected abnormal earnings on the grounds that the cost of capital is project specific and to determine it one must first solve the whole problem using cash flows.

The generalized accounting-based valuation formula is useful because it shifts the focus away from the distribution of wealth (dividends) to accounting measures of the creation of wealth (book value and abnormal earnings). Dividend policy irrelevance integrates naturally into the formula. In such a case, wealth creation depends solely on a firm's operations as opposed to the financing of those operations. Given this perspective, one shows that a firm's goodwill equals the present value of risk-adjusted expected abnormal *operating* earnings, provided the financial assets/liabilities are accounted for by mark-to-market accounting. If, in addition, operating activities are accounted for by cash accounting, then it follows that a firm's equity plus (net) debt equals the present value of the risk-adjusted operating cash flows. Feltham and Ohlson (1996) consider these issues, but the results here develop from much more generic assumptions and "first principles" analyses. We also emphasize that the accounting measurement concepts used in the generalized accounting-based valuation formula lead to easy and direct proofs of these specific results.

The remainder of the paper is organized as follows. Section II reviews the basic no arbitrage linear dividend valuation model from finance theory. Section III provides the foundation for our analysis of accounting-based valuation. Section IV explicates the idea of discounting risk-adjusted expectations. Section V deals with dividend policy irrelevancy and its effects on abnormal earnings. Section VI discusses implications of using cash accounting when one measures abnormal earnings. Summary remarks are provided in section VII.

II. THE NO ARBITRAGE DIVIDEND VALUATION MODEL

This section reviews how event-contingent dividends relate to market values in a multi-date setting in which securities trade in perfect markets without pure arbitrage opportunities.[2]

The model considers a sequence of dates $t = 0,1,...,T$. At each date, firms engage in exchange with investors (e.g., borrow, pay interest, raise equity capital and pay dividends) and investors trade claims and consume. The evolution of the economy is uncertain. A primitive state space $S = \{s\}$ represents all sources of uncertainty, i.e., each s identifies a possible complete history of the economy and S is the set of histories that has a positive prior probability of occurring. Investors have information about the economy at each date t. Event y_t identifies the set of histories that continues to have a positive probability of occurring at date t, and the set of possible events $Y_t = \{y_t\}$ defines a partition on S.[3] No information is lost with the passage of time, which implies Y_t is at least as fine a partition of S as is Y_{t-1}, all $t = 1,...,T$. Hence, for each y_t there exists a unique "parent" event y_{t-1} such that $y_t \subseteq y_{t-1}$.

Let J denote the set of tradable claims. For any $j \in J$, let $d_{tj}(y_t)$ denote the date t (net) dividend given event y_t.[4] This notation and language is meant to be sufficiently broad to include nonequity securities. Let $P_{tj}(y_t)$ denote the price at t of claim j in event y_t. Markets need not be complete, but we assume the existence of pure discount bonds for every possible maturity date.

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[2] For extensive discussion of the no arbitrage model of market values see, for example, Huang and Litzenberger (1988), Dothan (1990) or Duffie (1996).

[3] Investors must agree on the event algebra, i.e., the set of possible states S and the sequence of partitions $Y_1,...,Y_T$, but they can have heterogeneous beliefs about the likelihood of each state.

[4] All variables at a given date can be expressed as functions of either the state or the information available at that date. For example, $d_{tj}(s)$ represents the dividend (net of investments) paid to the equityholders of firm j at date t if state s occurs, and $d_{tj}(s) = d_{tj}(y_t)$, for all $s \in y_t$.

Date T is the last date in the economy and all firms cease to exist at, or prior to, that date. The model permits settings in which it is certain that a firm pays no dividends after some date $t < T$.

Assuming perfect markets, we next state a standard no arbitrage condition that is necessary for an equilibrium.

Definition: The economy satisfies *no* (riskless) *arbitrage* (NA) if, for every t and $y_t \subseteq Y_t$, there does not exist a portfolio $\{\zeta_j\}_{j \in J}$ for which the investment at t is nonpositive:

$$\sum_{j \in J} \zeta_j P_{tj}(y_t) \leq 0,$$

the return at t + 1 is certain to be non-negative:

$$\sum_{j \in J} \zeta_j [P_{t+1,j}(y_{t+1}) + d_{t+1,j}(y_{t+1})] \geq 0, \qquad \forall\, y_{t+1} \subseteq y_t,$$

and at least one of the inequalities is strict.

No arbitrage (NA) has an important valuation implication. For any t, y_t pair, one can express a firm's market value in terms of future event-contingent dividends by multiplying the dividends with some positive weights and summing the products. Specifically, there exists some $\xi_{t\tau}(y_\tau) > 0$, $y_\tau \subseteq y_t$, $\tau = t + 1, \ldots, T$, such that one obtains the following *dividend value relation* (DVR):

$$P_{tj}(y_t) = \sum_{\tau=t+1}^{T} \sum_{y_\tau \subseteq y_t} d_{\tau j}(y_\tau) \xi_{t\tau}(y_\tau). \tag{DVR}$$

Further, the converse applies. Hence, DVR is necessary as well as sufficient for NA.

Subsequent discussions often refer to a representative equity claim. In these cases we drop the subscript j, and no confusion should arise.

In the usual jargon, $\xi_{t\tau}(y_\tau) > 0$ represents the "implicit price" at date t given event y_t of a claim to consumption at τ if event y_τ occurs, where y_t is the unique parent event of y_τ. To be more precise, given event y_t at date t, an individual must pay $\xi_{t\tau}(y_\tau)$ to receive one unit of consumption in the event y_τ at $\tau > t$; if some event other than $y_\tau \subseteq y_t$ occurs at date τ, then the implied claim yields zero. (The notation $\xi_{t\tau}(y_\tau)$ need not explicitly include y_t because it is unique given "offspring event" y_τ.) Without going into technical details, we can loosely state that, in equilibrium, implicit price $\xi_{t\tau}(y_\tau)$ reflects the investors' beliefs at date t about the likelihood of event y_τ, the aggregate consumption that will occur in event y_τ, and the investors' preferences.

The relative prices do not change over time, but they are expressed in terms of a unit of current consumption. Hence, the implicit prices satisfy:[5]

$$\xi_{t\tau}(y_\tau) = \frac{\xi_{0\tau}(y_\tau)}{\xi_{0t}(y_t)}, \qquad \text{if } y_\tau \subset y_t \text{ (and zero otherwise).} \tag{1}$$

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[5] The prices at date t are expressed in terms of current consumption at date t. Relation (1) reflects the fact that the prices at date t are equivalent to the prices at date 0, subject only to a renormalization in terms of consumption at date t, which is accomplished by dividing by $\xi_{0t}(y_t)$ if y_t has occurred.

For future reference, let $R_{t\tau}(y_t)$ represent the riskless return on a dollar invested over the period that begins at date t and ends at date τ, given the current date t event y_t. In terms of implicit prices, it follows that:

$$R_{t\tau}(y_t) = \left[\sum_{y_\tau \subseteq y_t} \xi_{t\tau}(y_\tau)\right]^{-1}. \tag{2}$$

Further, a maturity period of one, i.e, $\tau = t + 1$, yields the date t *riskless spot rate* given event y_t:

$$\iota_t(y_t) \equiv R_{t,t+1}(y_t) - 1. \tag{3}$$

Observe that the riskless spot rate that will occur at any *future* date $\tau > t$ is uncertain at date t, since $\iota_\tau(y_\tau)$ will depend on the event $y_\tau \subseteq y_t$ that occurs.

III. A NO ARBITRAGE ACCOUNTING VALUATION MODEL

We now introduce two accounting variables: $bv_\tau(y_\tau)$ represents the date τ *book value* of the firm's equity, given y_τ; and $x_\tau(y_\tau)$ represents *accounting earnings* for the period ending at date τ, given y_τ. The net dividends, $d_\tau(y_\tau)$, represent all cash transactions between the firm and its equityholders.[6] A *clean surplus relation* (CSR) is assumed, which implies that all changes in the book value of equity, other than the cash transactions with equityholders, are deemed to be part of accounting earnings. Hence, for all $\tau = 1,\ldots,T$:

$$bv_\tau(y_\tau) = bv_{\tau-1}(y_\tau) + x_\tau(y_\tau) - d_\tau(y_\tau), \qquad \forall\, y_\tau \subseteq y_{\tau-1} \in Y_{\tau-1}, \tag{CSR}$$

where $bv_{\tau-1}(y_\tau) = bv_{\tau-1}(y_{\tau-1})$, any $y_\tau \subseteq y_{\tau-1}$. Further, given the date T termination of the economy:[7]

$$bv_T(y_T) \equiv 0.$$

We next consider the definition of abnormal (or residual) earnings, a construct that measures value creation relative to the underlying investment. To implement the construct, the standard approach deducts from earnings a charge for using related invested capital, and the latter component is operationalized by multiplying start-of-period book value with a measure of cost-of-capital. However, cost-of-capital as a concept lacks unambiguous definition unless the economy satisfies severe restrictions such as homogeneous beliefs and a flat, nonstochastic, term-structure of interest rates.

In the analysis that follows, there are no restrictions on the accounting measures other than CSR. However, one must use the *riskless spot rate* multiplied by the start-of-period book value to measure the charge for using capital in abnormal earnings. That is:

$$x^a_\tau(y_\tau) \equiv x_\tau(y_\tau) - \iota_{\tau-1}(y_{\tau-1})\, bv_{\tau-1}(y_{\tau-1}), \qquad \forall\, y_\tau \subseteq y_{\tau-1},\ \tau = 1,\ldots,T.$$

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[6] Equity consists of the firm's noncontingent residual claims (common stock), and the only direct equity transactions are cash dividends and the issuance of new equity at its market value (which is treated as a negative dividend). Other claims, such as preferred equity, are treated as debt. See Feltham (1996) for a discussion of the implications of the issuance of contingent-equity, such as warrants, executive stock options and convertible debt.

[7] There is a settling up at date T. The dividend at that date includes the distribution of both earned and contributed surplus, and earnings include any terminal gains or losses.

The use of the riskless spot rate may surprise the reader since it does not include any risk adjustment. Subsequent analysis will demonstrate why it works and why it is necessary.

Our main general result is that the market value of the firm's equity equals the book value of that equity plus the application of the (strictly) positive linear operator in DVR to future event-date-contingent abnormal earnings.

Proposition 1:[8] No arbitrage (NA) and the clean surplus relation (CSR) with $bv_T(s) = 0$, $\forall\ s \in S$, suffice for the following *accounting value relation* (AVR):

$$P_t(y_t) = bv_t(y_t) + \sum_{\tau=t+1}^{T} \sum_{y_\tau \subseteq y_t} x^a_\tau(y_\tau)\xi_{t\tau}(y_\tau). \qquad \text{(AVR)}$$

We emphasize that the implicit prices $\xi_{t\tau}(y_\tau)$ are the same whether one evaluates dividends or abnormal earnings. In other words, expressions DVR and AVR always yield the same value given any prespecified implicit prices.

Given NA and DVR, one sees that not only does DVR imply AVR, the converse is also true. This equivalence embeds the essence of the AVR concept: *One cannot arbitrage the distribution of wealth (i.e., dividends) if, and only if, one cannot arbitrage the creation of wealth (i.e., book value and abnormal earnings).* In formal terms, we have the following result.

Proposition 2: Assume AVR (or DVR and CSR). Then, for every t and $y_t \in Y_t$, there does not exist a portfolio $\{\zeta_j\}_{j\in J}$ for which the investment at t is nonpositive:

$$\sum_{j\in J} \zeta_j P_{tj}(y_t) \le 0,$$

the book value is non-negative:[9]

$$\sum_{j\in J} \zeta_j\, bv_{tj}(y_t) \ge 0,$$

the abnormal earnings are certain to be non-negative at each date $\tau > t$:

$$\sum_{j\in J} \zeta_j x^a_{tj}(y_t) \ge 0, \qquad \forall\ y_\tau,\ \tau > t,$$

and at least one of the inequalities is strict.

The subsequent section transforms AVR to a formula that more concretely generalizes the basic idea that value equals book value plus the present value of expected abnormal earnings adjusted for risk. Before doing so, however, it is important to keep in mind that this formulation ultimately rests on no arbitrage in current book value and anticipated abnormal earnings across future dates and events.

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[8] See appendix B for the proof.

[9] As with dividends and market value, a second subscript (e.g., i or j) on accounting numbers, such as abnormal earnings, refers to a specific firm.

No arbitrage in accounting data also yields a more direct implication that illustrates the workings of AVR. If one compares two firms and the first dominates the second in terms of current book value as well as abnormal earnings, for all future dates and events, then the first must be worth more.

Corollary 1: If firms i and j are such that $bv_{ti}(y_t) \leq bv_{tj}(y_t)$ and $x_{\tau i}^{a}(y_\tau) \leq x_{\tau j}^{a}(y_\tau)$, $\forall\, y_\tau \subseteq y_t$, $\tau = t + 1,\ldots,T$, with at least one strict inequality, then $P_{ti}(y_t) < P_{tj}(y_t)$.

The corollary resembles the standard observation that $P_{ti}(y_t) < P_{tj}(y_t)$ if $d_{\tau i}(y_\tau) \leq d_{\tau j}(y_\tau)$ for all $\tau > t$ and $y_\tau \subseteq y_t$, and where at least one inequality is strict. Dominance in future dividends does *not*, however, imply dominance in current book value/future abnormal earnings, or conversely. Flexibility in both accounting and dividend policies rules out this possibility.

IV. DISCOUNTING RISK-ADJUSTED EXPECTATIONS

The prior section provides a relatively abstract treatment of valuation based on linear operators. That approach, upon which finance theory rests, can be exploited to further characterize discount factors and risk adjustments. Two transformations of AVR (and DVR) facilitate this characterization. Subsequent analysis then shows why the capital-charge component of abnormal earnings depends on the spot interest rate without adjustment for risk.

The weights used in DVR can be restated so that value is expressed, without loss of generality, as the net present value of risk-adjusted expected dividends. In particular, DVR implies:

$$P_t(y_t) = \sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1} E^*[\tilde{d}_\tau | y_t], \qquad \text{(DVR-f*)}$$

where:

$$E^*[\tilde{d}_\tau | y_t] \equiv \sum_{y_\tau \subseteq y_t} d_\tau(y_\tau) f^*(y_\tau | y_t)$$

and

$$f^*(y_\tau | y_t) \equiv \xi_{t\tau}(y_\tau) R_{t\tau}(y_t), \qquad \text{for } y_\tau \subseteq y_t. \qquad (4)$$

Expression DVR-f* clearly shows that the term-structure of riskless interest rates determines the discount factors. The issue of risk is subtler, however. One conceptualizes f* as a *risk-adjusted probability function*,[10] and E* as a *risk-adjusted expectation operator*. This terminology is appropriate because f* satisfies the properties of a probability function, i.e., $f^* \geq 0$ and $\sum_{y_\tau \subseteq y_t} f^*(y_\tau | y_t) = 1$. Similarly, E* satisfies the properties of a regular conditional expectation operator. These risk adjustments trace back to the primitives—the implicit prices $\xi_{t\tau}(y_\tau)$—which reflect investors' risk aversion and beliefs.

This alternative form of the linear valuation function extends directly to AVR.

Corollary 2: AVR implies, using the risk-adjusted probability function f* defined in (4):

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[10] Dothan (1990) refers to f* as a "risk-adjusted probability function," but many in the recent finance literature, such as Duffie (1996), refer to it as a "risk-neutral probability function."

$$P_t(y_t) = bv_t(y_t) + \sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1}E^*[\tilde{x}^a_\tau|y_t], \qquad \text{(AVR-f*)}$$

where:

$$E^*[\tilde{x}^a_\tau|y_t] \equiv \sum_{y_\tau \subseteq y_t} x^a_\tau(y_\tau)f^*(y_\tau|y_t).$$

DVR-f* and AVR-f* are analytically equivalent: both use the term-structure of riskless interest rates as discount factors, and both use the risk-adjusted probability function f* to evaluate risk-adjusted dividends, $E^*[\tilde{d}_\tau|y_t]$, and risk-adjusted abnormal earnings, $E^*[\tilde{x}^a_\tau]y_t]$. The risk-adjusted probability function requires no change as one shifts from dividends to abnormal earnings.

One can develop some straightforward analysis showing why the riskless spot rate is used in measuring abnormal earnings in AVR-f*. The key here is to keep in mind that risk adjustments in DVR-f* and AVR-f* take place via the E* operator. First, note that DVR-f* is equivalent to:

$$P_t(y_t) = R_{t,t+1}(y_t)^{-1}E^*[\tilde{P}_{t+1} + \tilde{d}_{t+1}|y_t]. \qquad (5)$$

Similarly, with respect to AVR-f*, let $g_t(y_t) \equiv P_t(y_t) - bv_t(y_t)$ and it follows that:

$$g_t(y_t) = R_{t,t+1}(y_t)^{-1}E^*[\tilde{g}_{t+1} + \tilde{x}^a_{t+1}|y_t]. \qquad (6)$$

It is now easily verified that, given CSR, expressions (5) and (6) are equivalent for any measure $E^*[\cdot|\cdot]$ if, and only if, $x_{t+1}{}^a(y_{t+1}) = x_{t+1}(y_{t+1}) - \iota_t(y_t)\, bv_t(y_t)$. The capital-charge is based on the start-of-period book value and there is no risk associated with the magnitude of that charge.

The no arbitrage condition that underlies DVR-f* and AVR-f* places no particular restrictions on investors' preferences and beliefs, e.g., beliefs can be heterogeneous. However, a setting with homogeneous beliefs provides insight into the relation between risk-adjusted and "regular" expectations. As shown below, expected dividends and expected abnormal earnings are adjusted for their risks prior to discounting. Risk adjustments therefore take place in the *numerators* (i.e., the expectations) and not the *denominators* (i.e., the discount factors).

Let the beliefs be represented by a (conditional) probability function $f(y_\tau|y_t)$, $y_\tau \subseteq y_t$, defined on the event algebra $Y_1, Y_2, \ldots, Y_T$. While $f^*(y_\tau|y_t)$ satisfies the properties of a (conditional) probability function, it generally differs from $f(y_\tau|y_t)$, due to investor risk aversion. By normalizing the function f* with f, one obtains a *risk-adjustment index* $Q_{t\tau}$, defined as follows:[11]

$$Q_{t\tau}(y_\tau) \equiv \frac{f^*(y_\tau|y_t)}{f(y_\tau|y_t)} = R_{t\tau}(y_t)\,\frac{\xi_{t\tau}(y_\tau)}{f(y_\tau|y_t)}, \qquad \text{for } y_\tau \subseteq y_t. \qquad (7)$$

Using this risk-adjustment index, it follows from DVR that:

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[11] By construction, the valuation index satisfies:

$$E[\tilde{Q}_{t\tau}|y_t] = \sum_{y_\tau \subseteq y_t} Q_{t\tau}(y_\tau)f(y_\tau|y_t) = 1.$$

$$P_t(y_t) = \sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1}[E[\tilde{d}_\tau|y_t] + \text{Cov}[\tilde{d}_\tau, \tilde{Q}_{t\tau}|y_t]], \qquad \text{(DVR-Q)}$$

where the probability function f determines expected dividends and the covariance between dividends and the valuation index. The covariance terms adjust for risks in the expected dividends.

Just as one derives DVR-Q from DVR-f*, a formula AVR-Q follows from AVR-f*. Thus one obtains a formula expressing value as equal to book value plus the present value of risk-adjusted expected abnormal earnings, given some fixed set of beliefs f. There are no changes in the risk-adjustment variable $Q_{t\tau}$, since the same set of implicit prices support DVR and AVR.

Corollary 3: AVR implies, using the risk-adjustment index $Q_{t\tau}$ defined in expression (7):

$$P_t(y_t) = bv_t(y_t) + \sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1}[E[\tilde{x}^a_\tau|y_t] + \text{Cov}[\tilde{x}^a_\tau, \tilde{Q}_{t\tau}|y_t]]. \qquad \text{(AVR-Q)}$$

If risk neutral investors with homogeneous beliefs set equilibrium prices, then $Q_{t\tau}$ equals one (a constant) and the covariance term vanishes in DVR-Q as well as AVR-Q.

AVR-Q is in some ways more useful than AVR-f* because one can apply the former framework to develop linear parametric models. Appendix A illustrates this concept, including how the solution depends on assumptions related to the covariance terms.

A Pareto-efficient setting with concave and time-additive investor utility functions yield further insights into the nature of the risk-adjustment index.[12] Let $u_t(c_t(y_t))$ denote an investor's utility for date t consumption in event y_t. With these restrictions on investors' preferences and homogeneous beliefs, it follows that:

$$Q_{t\tau}(y_\tau) = \frac{u'_\tau(c_\tau(y_\tau))}{E[\tilde{u}'_\tau|y_t]}, \qquad \forall\, y_\tau \subseteq y_t.$$

Hence, Q reflects the marginal value of consumption. Given Pareto efficiency, individual consumption increases with aggregate consumption, which implies $Q_{t\tau}(y_\tau^1) < Q_{t\tau}(y_\tau^2)$, for $y_\tau^1, y_\tau^2 \subseteq y_t$, if, and only if, aggregate consumption at date τ is higher in event y_τ^1 than in event y_τ^2. From this well-known observation, one can deduce that $\text{Cov}[\tilde{d}_\tau, \tilde{Q}_{t\tau}|y_t] < 0$ and $\text{Cov}[\tilde{x}^a_\tau, \tilde{Q}_{t\tau}|y_t] < 0$ if, and only if, $\tilde{d}_\tau$ and $\tilde{x}^a_\tau$, respectively, correlate positively with aggregate consumption. Intuitively, risk adjustments reflect that the marginal value of dividends or abnormal earnings is "high" when aggregate consumption is "small" and is "low" when aggregate consumption is "large."

The robustness of the risk-adjustment construct f* (and $Q_{t\tau}$) is noteworthy. The same constructs apply for all assets, for both DVR-f* and AVR-f* (DVR-Q and AVR-Q), for all dividend policies and for all clean surplus accounting policies. The accounting policy affects the expected abnormal earnings and the covariances between abnormal earnings and aggregate consumption in specific periods, yet the accounting policies cannot affect the values obtained from AVR-f* (or AVR-Q).

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[12] Rubinstein (1976) derives this relation in a representative investor model, while Breeden and Litzenberger (1978) derive it in a complete market competitive equilibrium with many diverse investors. See Huang and Litzenberger (1988, chapter 7) for a review of the results for multi-person, multi-period equilibrium models.

The valuation formulae demonstrate that one does not adjust the discount factors to deal with risk. In this regard, the theory is unambiguous. Practical valuation analysis, however, tends to use "risk-adjusted discount factors," applied in geometric fashion to expected dividends (or cash flows). That is, this approach introduces a cost-of-capital parameter $\rho_t(y_t)$ such that:

$$P_t(y_t) = \sum_{\tau=t+1}^{T} (1 + \rho_t(y_t))^{-(\tau-t)} E[\tilde{d}_\tau | y_t]. \tag{8}$$

Given CSR, this expression is equivalent to:

$$P_t(y_t) = bv_t(y_t) + \sum_{\tau=t+1}^{T} (1 + \rho_t(y_t))^{-(\tau-t)} E[\tilde{x}_\tau^a | y_t], \tag{9}$$

provided that one now defines abnormal earnings by $x_t^a(y_t) \equiv x_t(y_t) - \rho_t(y_t) bv_{t-1}(y_t)$. Adjustments in discount factors therefore lead to symmetric adjustments in the measurement of the capital-charge.

These valuation formulae may be useful in practice and empirical research, but we underscore their lack of solid theoretical foundation. Given any values for price and expected dividends, there will always exist some parameter $\rho_t(y_t)$ such that expression (8), as well as expression (9), hold. However, the parameter $\rho_t(y_t)$ cannot generally be given any economic interpretation like "$\rho_t(y_t)$ relates directly to a firm's risk and expected return characteristics." An exception occurs only if $\rho_t(y_t)$ is independent of y_t and t, in which case one obtains:

$$E[(\tilde{P}_{t+1} + \tilde{d}_{t+1})/P_t(y_t) | y_t] = 1 + \rho,$$

for all y_t and t. Unfortunately, this condition is all too stringent: the expected return cannot vary with interest rates, the state of the economy, or the firm's financial (or operating) policies.

V. DIVIDEND POLICY IRRELEVANCE

As is well known in standard valuation theory, value depends on beliefs about future dividends, but value is not affected by a change in the dividend policy if it is implemented by means of zero NPV activities. This result applies to the dividend and accounting value relations considered in this paper.

If a change in dividend policy is implemented by trading in financial claims (e.g., riskless borrowing and lending) and the accounting for those claims is mark-to-market, then the impact on AVR is particularly simple. While future dividends, market values, earnings and book values will be influenced by the dividend policy, *risk-adjusted expected abnormal earnings are unchanged.*

To illustrate, consider a setting in which the planned, event-contingent, change in dividends is implemented by riskless borrowing (or lending) in the one-period spot market. Assume further that the accounting for interest expense follows standard principles, i.e., the incremental borrowing at the end of the previous period multiplied by the one-period spot rate determines the incremental interest expense. More formally, let $\{\delta_\tau(y_\tau)\}_{\tau>t}$ represent a sequence of future one-period event-contingent borrowing levels, i.e., $\delta_\tau(y_\tau)$ is borrowed at date τ if y_τ occurs and interest plus principal of $R_{\tau,\tau+1}(y_\tau) \cdot \delta_\tau(y_\tau)$ is repaid at date

$\tau + 1$. A negative δ_τ represents one-period riskless lending. Implementation of these borrowing levels result in the following revised dividends, market values, accounting earnings and book values for $\tau > t$:

$$d_\tau'(y_\tau) = d_\tau(y_\tau) + \delta_\tau(y_\tau) - R_{\tau-1,\tau}(y_{\tau-1})\cdot\delta_{\tau-1}(y_{\tau-1}),$$

$$P_\tau'(y_\tau) = P_\tau(y_\tau) - \delta_\tau(y_\tau),$$

$$x_\tau'(y_\tau) = x_\tau(y_\tau) - \iota_{\tau-1}(y_{\tau-1})\cdot\delta_{\tau-1}(y_{\tau-1}),$$

$$bv_\tau'(y_\tau) = bv_\tau(y_\tau) - \delta_\tau(y_\tau).$$

The following demonstrates that the abnormal earnings are unchanged:

$$\begin{aligned} x_\tau^{a\prime}(y_\tau &= x_\tau'(y_\tau) - \iota_{\tau-1}(y_{\tau-1})\cdot bv_{\tau-1}'(y_{\tau-1}) \\ &= x_\tau(y_\tau) - \iota_{\tau-1}(y_{\tau-1})\cdot\delta_{\tau-1}(y_{\tau-1}) - \iota_{\tau-1}(y_{\tau-1})\cdot[bv_{\tau-1}(y_{\tau-1}) - \delta_{\tau-1}(y_{\tau-1})] \\ &= x_\tau(y_\tau) - \iota_{\tau-1}(y_{\tau-1})\cdot bv_{\tau-1}(y_{\tau-1}) = x_\tau^a(y_\tau). \end{aligned}$$

The key here is that the application of the riskless spot rate to the change in the opening book value precisely offsets the change in accounting earnings, resulting in no change in abnormal earnings.

The preceding analysis and AVR leads to the following proposition.[13]

Proposition 3: Changes in planned dividends due to borrowing or lending at the one-period riskless spot rate has no effect on current book value and future abnormal earnings. Hence, the current value remains unchanged.

In sum, the dividend policy influences the timing and aggregate levels of future dividends even though it does not change their current market value. The dividend policy also influences the aggregate levels of accounting earnings. However, the dividend policy does not influence either the timing or the aggregate levels of abnormal earnings. In sharp contrast to the dividend value relations, all the components of accounting value relations are independent of planned changes in the dividend policy.

One can readily work through the algebra to establish that DVR and CSR imply AVR, but understanding why AVR "works" is subtle. Dividend policy irrelevancy can be used to provide insight. The accounting numbers in AVR represent the generation of value as reported by the accounting system, whereas dividends are the distribution of value. The distribution of value could coincide with the reported generation of value. That is, given CSR, there always exists a dividend policy such that dividends equal the current book value and the event/date contingent abnormal earnings. This alternative dividend policy can be implemented by, at each date $\tau \geq t$, borrowing the book value at the riskless one-period spot market. More specifically, there exists an alternative dividend policy such that $d_t'(y_t) = bv_t(y_t)$ and $d_\tau'(y_\tau) = x_\tau^a(y_\tau)$, for every $y_\tau \subseteq y_t$, $\tau > t$. If the accounting policy satisfies

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[13] No further proof is provided.

CSR, then borrowing $\delta_\tau(y_\tau) = bv_\tau(y_\tau)$, $y_\tau \subseteq y_t$, $\tau \geq t$ implements the alternative dividends. Proof is by induction. Assume the above relation holds up to $\tau - 1$, it then follows that:

$$\delta_\tau(y_\tau) = d_\tau'(y_\tau) + R_{\tau-1,\tau}(y_{\tau-1})\cdot\delta_{\tau-1}(y_{\tau-1}) - d_\tau(y_\tau)$$

$$= x_\tau^a(y_\tau) + R_{\tau-1,\tau}(y_{\tau-1})\cdot bv_{\tau-1}(y_{\tau-1}) - d_\tau(y_\tau)$$

$$= x_\tau(y_\tau) + bv_{\tau-1}(y_{\tau-1}) - d_\tau(y_\tau) = bv_\tau(y_\tau).$$

Observe that in this analysis, the capital-charge in abnormal earnings equals the interest paid on start-of-period borrowing, which equals start-of-period book value.

VI. FREE CASH FLOWS FROM OPERATIONS

Textbooks typically emphasize that market values ultimately depend on the present value of the anticipated cash flows. This precept can be viewed as yet another implication of dividend policy irrelevancy. More specifically, zero borrowing and lending would result in dividends equal to the free cash flows from operations, but differences in timing (and total amount) arise because borrowing and lending is generally not always zero. While the idea of deriving market values from anticipations of future free cash flows from operations seems sensible and even straightforward, the formal analysis in a model without restrictions on interest rates or risk adjustments requires care. This section derives the appropriate value relation for risk-adjusted expected cash flows using the no arbitrage framework. An important point emerges: the cash-value relation is but a special case of the accounting-value relation AVR.

Following Feltham and Ohlson (1995), the analysis separates operating activities from financial activities. This distinction is somewhat arbitrary, but one can usefully think of the financial assets as zero NPV activities such as marketable securities minus debt. Let $fa_\tau(y_\tau)$ and $oa_\tau(y_\tau)$ denote the respective book values for financial and operating assets, and let $fx_\tau(y_\tau)$ and $ox_\tau(y_\tau)$ denote the respective accounting earnings for the financial and operating activities. These variables satisfy:

$$bv_\tau(y_\tau) = fa_\tau(y_\tau) + oa_\tau(y_\tau)$$

and

$$x_\tau(y_\tau) = fx_\tau(y_\tau) + ox_\tau(y_\tau).$$

Cash flows from operations are net of capital expenditures, and, at the end of each period, this amount is transferred to financial assets. Let $\{c_\tau(y_\tau)\}_\tau$ denote the operating cash flows across events and dates. These cash flows equal dividends if the firm maintains zero financial assets (e.g., it *never* engages in borrowing or lending). That is $d_\tau(y_\tau) = c_\tau(y_\tau)$ if, and only if, $fa_\tau(y_\tau) = 0$, all y_τ and $\tau \geq t$. However, the firm can implement alternative dividend policies by investing and disinvesting in financial assets. The accounting is such that the book value of financial assets is increased by financial earnings and operating cash flows, and decreased by dividends to equity-holders. The following *financial asset relation* describes these flows in algebraic terms:

$$fa_\tau(y_\tau) = fa_{\tau-1}(y_{\tau-1}) + fx_\tau(y_\tau) + c_\tau(y_\tau) - d_\tau(y_\tau), \qquad \text{(FAR)}$$

with $fa_T(s) \equiv 0$, $\forall\, s \in S$.

FAR defines the clean surplus relation for "cash accounting"; in this case, financial ("cash") assets are the only assets assigned a nonzero book value (i.e., operating assets are assigned a zero book value, $oa_\tau \equiv 0$) and the total "cash earnings" for period τ equal $cx_\tau \equiv fx_\tau + c_\tau$. If the financial assets are carried at their market value (mark-to-market accounting) and fx_τ includes the increase in market value in period τ attributable to the return on the financial assets held at $\tau - 1$, then one obtains the following risk-adjusted *net interest relation:*[14]

$$E^*[\widetilde{fx}_\tau | y_{\tau-1}] = \iota_{\tau-1}(y_{\tau-1}) \cdot fa_{\tau-1}(y_{\tau-1}). \qquad \text{(NIR)}$$

Abnormal "cash earnings" equal:

$$cx_\tau^a = fx_\tau + c_\tau - \iota_{\tau-1}(y_{\tau-1}) fa_{\tau-1}.$$

NIR then implies:

$$E^*[\widetilde{cx}_\tau^a | y_{\tau-1}] = E^*[\widetilde{fx}_\tau | y_{\tau-1}] + E([\tilde{c}_\tau | y_{\tau-1}] - \iota_{\tau-1}(y_{\tau-1}) fa_{\tau-1} = E^*[\tilde{c}_\tau | y_{\tau-1}]. \qquad (10)$$

Consequently, Corollaries 2 and 3 work for cash accounting as well as accrual accounting, and given NIR they take a simple form.

Proposition 4:[15] No arbitrage (NA) and accounting relations FAR and NIR, with $fa_T(s) = 0$, $\forall\ s \in S$, suffice for the following *cash-value relation:*[16]

$$P_t(y_t) = fa_t(y_t) + \sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1} E^*[\tilde{c}_\tau | y_t]. \qquad \text{(CVR-f*)}$$

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[14] One can view the market value of the current financial assets as being derived from the subsequent payoffs attributable to those financial assets. The latter can be measured by dividends minus cash from operations, so that under mark-to-market accounting:

$$fa_t(y_t) = \sum_{\tau=t+1}^{T} \sum_{y_\tau \subseteq y_t} [d_\tau(y_\tau) - c_\tau(y_\tau)] \xi_{t\tau}(y_\tau).$$

Using mark-to-market accounting, FAR, and the fact that $f^*(y_\tau | y_{\tau-1}) = R_{\tau-1,\tau}(y_{\tau-1}) \xi_{\tau-1,\tau}(y_\tau)$ and $\xi_{t\tau}(y_\tau) = \xi_{\tau-1,\tau}(y_\tau) \xi_{t,\tau-1}(y_{\tau-1})$, for $y_\tau \subseteq y_{\tau-1}$, we obtain:

$$E^*[\widetilde{fx}_\tau | y_{\tau-1}] = R_{\tau-1,\tau}(y_{\tau-1}) \sum_{y_\tau \subseteq y_{\tau-1}} fx_\tau(y_\tau) \xi_{\tau-1,\tau}(y_\tau)$$

$$= R_{\tau-1,\tau}(y_{\tau-1}) \sum_{y_\tau \subseteq y_{\tau-1}} [fa_\tau(y_\tau) + d_\tau(y_\tau) - c_\tau(y_\tau) - fa_{\tau-1}(y_{\tau-1})] \xi_{\tau-1,\tau}(y_\tau)$$

$$= [R_{\tau-1,\tau}(y_{\tau-1}) - 1] fa_{\tau-1}(y_{\tau-1}) = \iota_{\tau-1}(y_{\tau-1}) fa_{\tau-1}(y_{\tau-1}).$$

[15] The proof follows directly from Proposition 1 and the preceding discussion.

[16] The calculation of the risk-adjusted expected cash flows can also be based on the correlation of the cash flows with risk-adjustment index $Q_{t\tau}$, i.e.:

$$P_t(y_t) = fa_t(y_t) + \sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1} [E[\tilde{c}_\tau | y_t] + \mathrm{Cov}[\tilde{c}_\tau, \tilde{Q}_{t\tau} | y_t]].$$

The structure of CVR-f* follows from the fact that the market value of financial assets depends only on information conveniently provided by the balance sheet, whereas the market value of operating assets depends on a projection of future operating cash flows. An extreme asymmetry prevails in the valuation of the two asset types. The underlying reason for the asymmetry is nevertheless logical. Due to NIR, financial assets have zero risk-adjusted expected abnormal earnings, and there is a one-to-one correspondence between market and book values. Operating assets, in contrast, have an assigned book value of zero, and thus the present value of operating abnormal earnings under cash accounting—which equals the operating cash flows—determine their market value. A unifying framework for both asset types is provided by the concept that the book value plus the present value of future abnormal earnings equals the market value. Accordingly, CVR-f* conveniently illustrates that the concept works for zero abnormal earnings as well as zero book value.

Under cash accounting there is no capital-charge for operating assets, because the book value of operating assets equal zero (i.e., all operating expenditures are "expensed" immediately). This observation suggests that the use of cash accounting has an advantage since application of CVR-f* does not require any projection of future spot rates of interest and book values across events and dates. This argument may have some merit from a practical perspective. From the perspective of theory, however, these purported advantages of cash flow analysis are more dubious since they depend on bounded rationality. The formal analysis does not, of course, allow for any "cost of implementing the various present value formulae."

In spite of the popularity and simplicity of the present value analysis of operating cash flows when valuing operations, we underscore that this valuation approach is a special case. Accrual accounting for operations works no less well. More formally, given CSR:

$$oa_t(y_t) = oa_{t-1}(y_{t-1}) + ox_t(y_t) - c_t(y_t), \tag{OAR}$$

and

$$ox_t^a(y_t) = ox_t(y_t) - \iota_{t-1}(y_{t-1}) \cdot oa_{t-1}(y_{t-1}),$$

so that

$$c_t(y_t) = ox_t^a(y_t) + R_{t-1}(y_{t-1}) \cdot oa_{t-1}(y_{t-1}) - oa_t(y_t).$$

Substituting the latter into the expression for the value of operating cash flows provides the following result.

Proposition 5:[17] Assume NA and accounting relation OAR. The value of the firm's operating assets can be represented as:

$$\sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1} E^*[\tilde{c}_\tau | y_t] = oa_t(y_t) + \sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1} E^*[o\tilde{x}_\tau^a]. \tag{11}$$

The above proposition clearly refutes the idea that only the present value of cash flows is appropriate in value analysis. Sufficiency should not be confused with necessity.

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[17] The proof parallels the proof of Proposition 1. One can also view this result as a corollary of Propositions 1 and 4—recognizing that $E^*[\tilde{x}_\tau^a | y_t] = E^*[\widetilde{ox}_\tau^a | y_t]$ and $bv_t = fa_t + oa_t$.

An obvious question is whether projections of accrual-based abnormal operating earnings have any potential advantage over the projections of operating cash flows in valuing operating assets. A positive response could modify the previously suggested relative efficacy of cash accounting. One potential benefit of accrual accounting relates to the possibility that a truncation of the time horizon T may yield an approximation of the "true" value.[18] That is, it may be the case that:

$$\sum_{\tau=t+1}^{T} R_{t\tau}(y_t)^{-1}E^*[\tilde{ox}_\tau^a|y_t] \approx \sum_{\tau=t+1}^{H} R_{t\tau}(y_t)^{-1}E^*[\tilde{ox}_\tau^a|y_t],$$

for some $H < T$. As a matter of mathematics, this approximation makes sense if the (sum of) the deleted terms $R_{t\tau}^{-1}\ E^*[\tilde{ox}_\tau^a|y_t]$, $\tau = H + 1,\ldots,T$ are relatively small. Concerning the accounting and economic environment, the issue is more complicated. Two conditions, if satisfied, facilitate horizon truncation. First, truncation is facilitated if $oa_t(y_t)$ does not deviate "too much" from the "true" market value. Second, truncation is facilitated if the risk-adjusted expected abnormal earnings, $E^*[\tilde{ox}_\tau^a|y_t]$, tend to decline in absolute value as τ increases and approach zero for large τ. The first condition minimizes the burden on the projected abnormal earnings, and the second suggests that the firm's projected profitability many years out has little impact on current goodwill.[19]

VII. CONCLUDING REMARKS

Modern valuation theory develops from no arbitrage and the existence of event-contingent "implicit" prices. These prices, in turn, underpin the various versions of the dividend valuation formulae. At first sight, this approach seems abstract and perhaps even convoluted. However, the relatively abstract approach reflects generality, and it ensures that one can make fairly sweeping, yet concrete, statements concerning the role of accounting data in equity valuations. On the basis of the analysis in this paper, we emphasize the following points.

- A weak condition of no arbitrage on future dividends leads to a general claim: Given clean surplus accounting, equity value can always be thought of as equal to book value plus the present value of anticipated abnormal earnings. Alternatively, one cannot create zero-cost portfolios that arbitrage positive (current) book values and positive (future) abnormal earnings. Popular notions that book values do not bear on equity value lack validity.
- The theory shows that the second part of the definition of abnormal earnings—the cost of using capital—requires that one multiply the start-of-period book value by the short-term, *riskless, spot rate*. Suggestions to the contrary are generally invalid unless one imposes relatively arbitrary restrictions on the risk adjustment in the present value of (expected) dividends formula.
- The relevance of accounting data in equity valuation does not depend on restrictive dividend policies, such as a fixed payout ratio. On the contrary, the key variable, abnormal earnings, is invariant to changes in the dividend policy that are implemented by riskless borrowing/lending in the spot rate.
- The analysis refutes popular notions that a conceptually valid assessment of market value must focus on anticipated cash flows rather than anticipated realizations of

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[18] For further discussion of truncation see Bernard (1995) and Ou and Penman (1994).

[19] See Penman and Sougiannis (1998) for an example of an empirical study that explores the truncation issue.

accounting data. Current book value plus the present value of future abnormal earnings provides a general framework, and the present value of cash flows formula arises merely as a special case.

- A focus on cash flows follows from *pro forma* cash accounting, but there are no known conceptual advantages associated with *pro forma* cash accounting as opposed to accrual accounting. Though one can argue that cash accounting simplifies valuation because it avoids the measurement of the cost of using capital, one can also argue that accrual accounting is potentially advantageous because it facilitates horizon truncation.

APPENDIX A
A PARAMETRIC MODEL WITH PRICED-RISK

This appendix illustrates the impact of risk on valuation by introducing risk into the information model examined in Feltham and Ohlson (1995). We assume a flat term-structure and a linear information model, but we do not assume risk neutrality. More specifically, the following assumptions are made.

A1 A flat and nonstochastic term-structure:

$$R_{t\tau}(y_t) = R^{\tau-t}, \qquad \text{for all } y_t \text{ and } \tau > t. \tag{A1}$$

A2 No arbitrage and CSR. Hence, given A1:

$$P_t(y_t) - bv_t(y_t) \equiv g_t(y_t) = \sum_{\tau=t+1}^{\infty} R^{-(\tau-t)}\{E[\tilde{x}_\tau^a|y_t] + Cov[\tilde{x}_\tau^a, \tilde{Q}_{t\tau}|y_t]\}$$

or, equivalently:

$$g_t(y_t) = R^{-1}\{E[\tilde{g}_{t+1} + \tilde{x}^a_{t+1}|y_t] + Cov[\tilde{g}_{t+1} + \tilde{x}^a_{t+1}, \tilde{Q}_{t,t+1}|y_t]\}. \tag{A2}$$

A3 The vector $y_t = (x_t^a, oa_t, \upsilon_{1t}, \upsilon_{2t})$ represents the date t information, where υ_{1t} and υ_{2t} are two random variables representing "other" information, and the information dynamics are:

$$\begin{aligned}
\tilde{x}^a_{t+1} &= \omega_{11}x_t^a + \omega_{12}oa_t + \upsilon_{1t} + \tilde{\varepsilon}_{1,t+1}\\
\tilde{oa}_{t+1} &= \omega_{22}oa_t + \upsilon_{2t} + \tilde{\varepsilon}_{2,t+1}\\
\tilde{\upsilon}_{1,t+1} &= \gamma_1\upsilon_{1t} + \tilde{\varepsilon}_{3,t+1}\\
\tilde{\upsilon}_{2,t+1} &= \gamma_1\upsilon_{2t} + \tilde{\varepsilon}_{4,t+1}
\end{aligned} \tag{A3}$$

where $\tilde{\varepsilon}_{k,t+1}$, k = 1,2,3,4, are random variables with $E[\varepsilon_{k\tau}|y_t] = 0$, all t, $\tau > t$.

A4 "Priced-risk" at date t + 1 is assumed to depend on only the operating assets at date t. More specifically, we assume that, for some parameter σ_{12}:

$$\mathrm{Cov}[\tilde{\varepsilon}_{1,t+1}, \tilde{Q}_{t,t+1}|y_t] = -\sigma_{12}oa_t,$$

whereas:

$$\mathrm{Cov}[\tilde{\varepsilon}_{k,t+1}, \tilde{Q}_{t,t+1}|y_t] = 0, \qquad \text{for } k = 2,3,4. \tag{A4}$$

Using the techniques developed by Garman and Ohlson (1980) and reviewed by Ohlson (1990), one can show that the assumptions imply:

$$g_t(y_t) = \alpha_1 x_t^a + \alpha_2 oa_t + \beta_1 \upsilon_{1t} + \beta_2 \upsilon_{2t},$$

where:

$$\alpha_1 = \frac{\omega_{11}}{R - \omega_{11}}$$

$$\alpha_2 = \frac{R}{R - \omega_{11}} \frac{\omega_{12} - \sigma_{12}}{R - \omega_{22}}$$

$$\beta_1 = \frac{R}{R - \omega_{11}} \frac{1}{R - \gamma_1}$$

and:

$$\beta_2 = \alpha_2 \frac{1}{R - \gamma_2}.$$

Parameters α_1 and β_1 are exactly the same as in the risk-neutral model in Feltham and Ohlson (1995, Proposition 3), whereas α_2 and β_2 are equivalent to the corresponding parameters in their model if, and only if, $\sigma_{12} = 0$. If $\sigma_{12} > 0$, then α_2 and β_2 are reduced, representing the fact that the anticipated priced-risk at date τ is proportional to the anticipated size of the firm as represented by the book value of its operating assets at date $\tau - 1$.

APPENDIX B
PROOF OF PROPOSITION 1

The following result is used in the proof:

$$R_{\tau-1,\tau}(y_{\tau-1}) \sum_{y_\tau \subset y_{\tau-1}} \xi_{t\tau}(y_\tau) = \left[\sum_{y_\tau \subset y_{\tau-1}} \frac{\xi_{0\tau}(y_\tau)}{\xi_{0,\tau-1}(y_{\tau-1})}\right]^{-1} \sum_{y_\tau \subset y_{\tau-1}} \frac{\xi_{0\tau}(y_\tau)}{\xi_{0t}(y_t)} \quad \text{from (1) and (2)}$$

$$= \frac{\xi_{0,\tau-1}(y_{\tau-1})}{\xi_{0t}(y_t)} \quad \text{cancelling terms}$$

$$= \xi_{t,\tau-1}(y_{\tau-1}), \quad \text{from (1);} \tag{B1}$$

We also use the fact that there is a unique event $y_{\tau-1}$ preceding any given event y_τ, so that we can use the following definitions: $bv_{\tau-1}(y_\tau) \equiv bv_{\tau-1}(y_{\tau-1})$, $\iota_{\tau-1}(y_\tau) \equiv \iota_{\tau-1}(y_{\tau-1})$, and $R_{\tau-1,\tau}(y_\tau) \equiv R_{\tau-1,\tau}(y_{\tau-1})$, for any $y_\tau \subseteq y_{\tau-1}$.

The proof of the first part of the proposition is as follows:

$$bv_t(y_t) + \sum_{\tau=t+1}^{T} \sum_{y_\tau \subseteq y_t} x_\tau^a(y_\tau)\xi_{t\tau}(y_\tau)$$

$$= bv_t(y_t) + \sum_{\tau=t+1}^{T} \sum_{y_\tau \subset y_t} [x_\tau(y_\tau) - \iota_{\tau-1}(y_\tau)bv_{\tau-1}(y_\tau)]\xi_{t\tau}(y_\tau) \qquad \text{from the definition of } x_\tau^a$$

$$= bv_t(y_t) + \sum_{\tau=t+1}^{T} \sum_{y_\tau \subset y_t} [x_\tau(y_\tau) + bv_{\tau-1}(y_\tau) - bv_{\tau-1}(y_\tau)R_{\tau-1,\tau}(y_\tau)]\xi_{t\tau}(y_\tau)$$

from the definition of $\iota_{\tau-1}$

$$= \sum_{\tau=t+1}^{T} \sum_{y_\tau \subset y_t} [x_\tau(y_\tau) + bv_{\tau-1}(y_\tau) - bv_\tau(y_\tau)]\xi_{t\tau}(y_\tau) \qquad \text{from (B1) and collecting terms}$$

$$= \sum_{\tau=t+1}^{T} \sum_{y_\tau \subset y_t} d_\tau(y_\tau)\xi_{t\tau}(y_\tau) \qquad \text{from CSR}$$

$$= P_t(y_t) \qquad \text{from DVR.}$$

The proof of the second part of the proposition is by contradiction. If the inequalities hold and at least one is strict, then AVR implies that the portfolio has a positive cost. **Q.E.D.**

REFERENCES

Bernard, V. 1995. The Feltham-Ohlson framework: Implications for empiricists. *Contemporary Accounting Research* 11 (Spring): 733–747.

Breeden, D., and R. Litzenberger. 1978. Prices of state-contingent claims implicit in option prices. *Journal of Business* 51: 621–651.

Dothan, M. U. 1990. *Prices in Financial Markets*. New York, NY: Oxford University Press.

Duffie, D. 1996. *Dynamic Asset Pricing Theory*. 2nd edition. Princeton, NJ: Princeton University Press.

Edey, H. C. 1957. Business valuation, goodwill and the super-profit method. *Accountancy* (January/February).

Edwards, E. O., and P. W. Bell. 1964. *The Theory and Measurement of Business Income*. Berkeley, CA: University of California Press.

Fama, E. 1977. Risk-adjusted discount rates and capital budgeting under uncertainty. *Journal of Financial Economics* 5 (August): 3–24.

Feltham, G. A., and J. A. Ohlson. 1995. Valuation and clean surplus accounting for operating and financial activities. *Contemporary Accounting Research* 11 (Spring): 689–731.

———, and ———. 1996. Uncertainty resolution and the theory of depreciation measurement. *Journal of Accounting Research* 34 (Autumn): 209–234.

———. 1996. Valuation, clean surplus accounting, and anticipated equity transactions. Working paper, University of British Columbia.

Garman, M. B., and J. A. Ohlson. 1980. Information and the sequential valuation of assets in arbitrage-free economies. *Journal of Accounting Research* 19 (Autumn): 420–441.

Huang, C., and R. H. Litzenberger. 1988. *Foundations for Financial Economics*. New York, NY: North-Holland.

Ohlson, J. A. 1990. A synthesis of security valuation theory and the role of dividends, cash flows, and earnings. *Contemporary Accounting Research* 6 (Spring): 648–676.

———. 1995. Earnings, book values, and dividends in security valuation. *Contemporary Accounting Research* 11 (Spring): 661–687.

Ou, S., and S. Penman. 1994. Financial statement analysis and the evaluation of market-to-book ratios. Working paper, University of California at Berkeley.

Peasnell, K. V. 1981. On capital budgeting and income measurement. *Abacus* 17 (June): 52–67.

———. 1982. Some formal connections between economic values and yields and accounting numbers. *Journal of Business Finance and Accounting* 9 (Autumn): 361–381.

Penman, S., and T. Sougiannis. 1998. A comparison of dividend, cash flow, and earnings approaches to equity valuation. *Contemporary Accounting Research* 15 (Fall): 343–383.

Preinreich, G. A. D. 1937. Goodwill in accountancy. *Journal of Accountancy* 93 (July): 28–50.

Rubinstein, M. 1976. The valuation of uncertain income streams and the pricing of options. *Bell Journal of Economics* 7 (Autumn): 407–425.

Stark, A. W. 1986. More on the discounting of residual income. *Abacus* 22 (March): 20–28.

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Does Forecast Accuracy Matter to Security Analysts?

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ABSTRACT: We investigate if earnings forecast accuracy matters to security analysts by examining its association with analyst turnover. Controlling for firm- and time-period effects, forecast horizon and industry forecasting experience, we find that an analyst is more likely to turn over if his forecast accuracy is lower than his peers. We find no association between an analyst's probability of turnover and his absolute forecast accuracy. We also investigate another observable measure of the analyst's performance, the profitability of his stock recommendations. There is no statistical relation between the absolute or relative profitability of an analyst's stock recommendations and his probability of turnover. We interpret our findings as indicating that forecast accuracy is important to analysts.

Key Words: *Security analysts, Forecast accuracy, Recommendation profitability, Performance evaluation.*

Data Availability: *Data are commercially available from the sources identified in the text.*

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I. INTRODUCTION

We investigate if earnings forecast accuracy matters to security analysts by examining its association with analyst turnover. Although academics routinely employ analysts' forecasts as a proxy for the market's expectation for earnings and investors require accurate earnings forecasts in many stock valuation models, no empirical evidence exists indicating that forecast accuracy is of consequence to analysts. In fact, anecdotal business press evidence suggests that an analyst's bonus, which may be one to three times his base salary, is chiefly determined by his ability to generate investment business and/or trading volume for his brokerage house. The accuracy of an analyst's earnings forecasts is rarely a factor in his bonus determination (Dorfman 1991, C1; Eccles and Crane 1988, 174–175; Morgenson 1997, 165).

Consistent with relative performance evaluation, we find that an analyst is more likely to turn over if his forecast accuracy is lower relative to his peers. We find no association between an analyst's probability of turnover and his *absolute* forecast accuracy. The relation between relative accuracy and turnover holds regardless of the number of times the analyst has changed jobs. If turnover captures analysts' incentives, our findings indicate that forecast accuracy matters to analysts.

Other dimensions of the analyst's job may be associated with turnover. Another observable measure of an analyst's performance is his stock-picking ability. Market participants frequently assert that the appropriate measure of an analyst's performance is his recommendation profitability (e.g., Heitner 1991, 5). These assertions suggest that, to maximize his performance evaluation, an analyst will focus his efforts on producing profitable stock recommendations. Hence, an alternative explanation for our accuracy results is that forecast accuracy is not associated with analyst turnover, but is correlated with the profitability of an analyst's stock recommendations.

To investigate this explanation for our results, we examine the relation between turnover and the absolute and relative profitability of an analyst's stock recommendations. We find that neither measure of recommendation profitability is statistically significant in explaining analyst turnover. Further, the association between relative forecast accuracy and turnover is still significant when we include the recommendation profitability measures as explanatory variables in our logit model. These results for recommendation profitability may be caused by our coarse proxy (turnover) for performance evaluation. Alternatively, if turnover is dependent on assessments of an analyst's unobservable effort, relative forecast accuracy may be more revealing of effort than the short-run profitability of stock recommendations.

The reasons for analyst turnover include involuntary termination for poor performance, voluntary turnover in anticipation of involuntary termination, or voluntary termination for a better job. We assume that turnover in our sample is dominated by the first two categories; our empirical results support this assumption. Thus, turnover is a reasonable, albeit noisy, indicator of forced job changes. Further, our results hold for the subsample of analysts for whom turnover is most likely to be involuntary. Thus, our conclusions are not sensitive to the possible inclusion of voluntary termination in our sample.

This paper makes two primary contributions. First, assuming that turnover proxies for performance evaluation by capturing forced job changes, we provide direct evidence that forecast accuracy is important to analysts. We find that analysts who are relatively less accurate than their peers are more likely to experience turnover, providing justification for academics' and investors' reliance on analyst forecasts. Second, we document a low correlation between forecast accuracy and recommendation profitability, suggesting that forecasting earnings and picking stocks require different skills, are affected by external noncontrollable factors to different degrees, or are evaluated and rewarded differentially by brokerage houses.

Section II reviews prior research. Section III discusses the sample. We present the empirical results in section IV. Section V provides sensitivity analyses; section VI concludes the paper.

II. PRIOR RESEARCH

Prior research provides no direct evidence that analysts have incentives to improve their forecast accuracy. Early research emphasized the identification of properties, such as timeliness and source, of the *forecast* affecting accuracy (e.g., O'Brien 1988). The underlying motivation of this research was that, while analyst forecasts were used as proxies for market earnings expectations, the forecast properties were not well understood. Brown et al. (1987) found that analyst forecasts were generally more accurate than time-series model forecasts (see also O'Brien 1988). They attribute their finding to the analyst's contemporaneous (better use of available information at the time-series model forecast date) and timing (use of information available after the time-series model forecast date) advantages relative to time-series models. Analysts' superiority relative to time-series models in forecasting earnings implies that they expend effort to provide more accurate earnings forecasts than those obtained from mechanical methods. This indirectly supports the notion that accuracy matters to analysts.

More recent research has focused on attributes of the *forecaster* affecting accuracy. For example, Clement (1998) and Mikhail et al. (1997) find that as an analyst's experience following a firm increases, so does his forecast accuracy. Our work continues this more recent emphasis on the forecaster by examining how incentives motivate or affect performance. Other recent research examining differences in analyst incentives also provides indirect evidence that accuracy may matter to analysts. Dechow et al. (1997) and Dugar and Nathan (1995) examine two groups of sell-side analysts: affiliated—those whose employer has an investment banking relationship with the firm for which a forecast is issued—and unaffiliated—those whose employer has no such relationship. This research finds a difference in forecast bias between these groups, but no difference in forecast accuracy, providing evidence that analysts may bias their forecasts more to please firm managers who are clients. However, the lack of a statistical difference in accuracy between these groups suggests that accuracy may be of consequence to analysts. That is, analysts may be willing to trade off the sign of their forecast error, but not its magnitude, to curry management favor (see also Francis and Philbrick 1993).

III. SAMPLE AND DESCRIPTIVE STATISTICS

We examine the relation between turnover, accuracy and stock recommendation profitability using a sample of analysts who issue quarterly earnings forecasts for each quarter of the year. We focus on the analyst's primary industry, the 2-digit SIC containing the greatest proportion of firms he follows, to minimize across-industry differences in the difficulty of forecasting earnings and also because analysts typically cover one industry (Wiegold 1998, R2).

We gather all quarterly forecasts issued by individual analysts from the Zacks Investment Research database (Zacks) with quarterly primary earnings per share excluding extraordinary items (adjusted for stock splits and dividends) and beginning-of-quarter price from Compustat for 1980 to 1995.[1] When an analyst issues more than one forecast for the same firm and quarter, we use the forecast issued closest but prior to the quarterly earnings announcement date to mitigate the effect of forecast horizon on forecast accuracy.[2] We eliminate analyst-firm-year combinations for which the analyst did not issue a quarterly earnings forecast for the firm for each quarter to ensure that the sample analysts consistently followed the firm in the year preceding turnover. Moreover, since forecast accuracy varies by fiscal quarter (Mikhail et al. 1997), this requirement mitigates differences in accuracy across analysts due to differences in the quarter forecasted. We also eliminate observations corresponding to firms that are not followed by at least five analysts whose primary industry is the 2-digit SIC to which the firm belongs to ensure that there is a meaningful comparison group against which to rank the analyst's accuracy.

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[1] We eliminate forecasts associated with 326 analyst codes on Zacks corresponding to either a firm or an unidentified individual.

The final sample contains 5,434 analyst-year combinations, representing 1,607 analysts from 1985 to 1995.[3] For these 5,434 analyst-year observations, we determine whether the analyst changed brokerage houses during the following year (TURNOVER). We employ an annual turnover measure (but base forecast accuracy on aggregated quarterly performance in the prior year) for two reasons. First, Zacks does not always capture turnover decisions in a timely fashion. For 4.9 percent of the analyst-brokerage house combinations on Zacks (representing 20.9 percent of turnover observations), the same analyst code is simultaneously affiliated with two brokerage house codes. By measuring turnover on an annual basis, we reduce the potential discrepancy in analyst employer classification. Second, bonuses are determined on an annual basis suggesting that performance *throughout* the year is an input in brokerage bonus and retention decisions. All our results hold, however, if we measure absolute and relative forecast accuracy using annual forecasts.

To measure forecasting ability we use an *absolute* (proximity of the analyst forecast to actual earnings) and a *relative* (proximity of the forecast to the earnings realization relative to peer analysts) accuracy measure. To measure absolute accuracy, we first calculate the mean absolute percentage error (MAPE), the absolute value of actual earnings minus the forecast deflated by beginning-of-quarter price, for each firm j analyst i followed in his primary industry during year t ($ABS\_ACC_{i,j,t}$). Analyst i's absolute accuracy in year t is the average of $ABS\_ACC_{i,j,t}$ across all firms in his primary industry ($ABS\_ACC_{i,t}$), multiplied by negative one so that high (low) levels of $ABS\_ACC_{i,t}$ correspond to more (less) accurate analysts.

To compute the relative accuracy measure, we rank an analyst's $ABS\_ACC_{i,j,t}$ relative to that of all other analysts with the same primary industry following the same firm during year t. These comparison analysts may be employed at the same brokerage house or not, but must have the same primary industry and have issued at least one forecast for each quarter of the year for the firm for which they serve as a comparison group. A rank of n, representing the number of analysts following the firm in that year, corresponds to the most accurate analyst. We divide this rank by the number of analysts issuing forecasts for that firm and year. This rank ranges from 1/n to 1, with high levels corresponding to relatively more accurate analysts, and represents analyst i's rank accuracy for firm j and year t relative to his cohort analysts ($RANK\_ACC_{i,j,t}$). The rank accuracy statistic for analyst i and year t is the average of $RANK\_ACC_{i,j,t}$ across all firms in analyst i's primary industry ($RANK\_ACC_{i,t}$).

Because experience is positively associated with forecast accuracy (Clement 1998; Mikhail et al. 1997), failure to control for the analyst's experience level could induce a spurious relation between TURNOVER and accuracy. We calculate analyst i's industry experience ($INDEXP_{i,t}$) as the number of prior firm quarters the analyst issued a quarterly forecast for every firm he follows in his primary industry. We measure industry-specific, rather than firm-specific experience, because $ABS\_ACC_{i,t}$ and $RANK\_ACC_{i,t}$ are calculated on an industry basis.

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[2] To ensure that differences in forecast horizon do not confound our findings, we included HORIZON (the number of days between the earnings announcement date and the issuance of the forecast) in all empirical specifications; all results were unchanged.

[3] Our final sample contains no observations from 1980 to 1984 because of insufficient data.

To examine whether turnover is associated with an analyst's ability to issue profitable stock recommendations, we measure the total return of an analyst's stock recommendations by taking long positions in his strong buy and buy recommendations and short positions in his strong sell and sell recommendations. For analyst i for firm j during year t, we calculate the market-adjusted return (compounded daily stock return less the compounded daily value-weighted market return on CRSP) from the date the recommendation was issued until the earlier of either the issuance of a revised recommendation or the end of the calendar year ($ABS\_PROF_{i,j,t}$).[4] The absolute profitability statistic for analyst i in year t is the average of $ABS\_PROF_{i,j,t}$ across all firms in analyst i's primary industry ($ABS\_PROF_{i,t}$).

To measure an analyst's relative recommendation profitability, we rank $ABS\_PROF_{i,j,t}$ for each analyst relative to that of all other analysts in his primary industry following the same firm during year t.[5] We divide this rank by the number of analysts issuing stock recommendations for that firm and year ($RANK\_PROF_{i,j,t}$). The rank profitability statistic for analyst i in year t is the average of $RANK\_PROF_{i,j,t}$ across all firms in analyst i's primary industry ($RANK\_PROF_{i,t}$). Data to calculate $ABS\_PROF_{i,t}$ and $RANK\_PROF_{i,t}$ are available for 2,508 observations in our sample.

Table 1 provides descriptive statistics on analyst turnover. Panel A indicates that 52 percent of the sample analysts did not turn over during the sample period; 41 percent changed employers once; 7 percent changed more than once. We examine if the relation between turnover and accuracy differs, conditional on the frequency of turnover in section V. Panel B provides the annual breakdown of the sample and the frequency of turnover. We reject the null hypothesis that the distribution of turnover observations across years (panel B, last column) is equal to the distribution of sample observations across years (panel B, third column; $\chi^2(10) = 22.38$, two-tailed $p < 0.02$). We consider the potential effect of calendar time clustering on our findings in section IV.

Table 2 provides descriptive statistics on accuracy for the entire sample (panel A), the subsample corresponding to years when the analyst did not change brokerage houses (TURNOVER = 0, panel B), and the subsample corresponding to years when the analyst changed brokerage houses (TURNOVER = 1, panel C). In the overall sample (panel A), the mean (median) value of ABS_ACC is −0.0113 (−0.0052), comparable to the MAPE of all 30-day consensus analyst forecasts on Zacks with Compustat earnings data during 1985 to 1995 (mean = −0.0134; median = −0.0025; results not presented). Consistent with prior research, the sample forecasts tend to be upwardly biased. We define BIAS as actual earnings minus the analyst forecast, deflated by beginning-of-quarter price. The mean (median) bias is −0.0050 (−0.0005) ($t = -10.37$, one-tailed $p < 0.01$; Wilcoxon $Z = 13.96$, one-tailed $p < 0.01$).

The means (medians) of RANK_ACC and RANK_PROF are 0.5708 (0.5762) and 0.5328 (0.5333), respectively. The mean (median) number of prior firm-quarter forecasts issued in the analyst's primary industry is 213 (151). The mean (median) industry experience for all analyst-year combinations on Zacks from 1985 to 1995 is 122 (55); thus, the

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[4] The results hold if we use gross, instead of market-adjusted, returns.

[5] This comparison group is the same group used to determine an analyst's RANK_ACC beginning in 1989, the first year for which Zacks recommendation data are available.

TABLE 1
Descriptive Statistics on Turnover[a]

Panel A: Frequency of Turnover for Sample Analysts

Turnover Frequency	*Number*	*Percentage*
0	836	52.0
1	653	40.6
2	103	6.4
3	10	0.6
4	4	0.2
5	1	0.1
Number of Analysts	1,607	100.0

Panel B: Frequency of Sample Observations by Year

	Entire Sample		*Observations with TURNOVER = 1*		
Year	*Number*	*Percent of Total*	*Number*	*Percent of Total*	*Percent of Annual Sample*
85	198	3.6	11	1.2	5.6
86	353	6.5	64	7.0	18.1
87	414	7.6	74	8.1	17.9
88	446	8.2	81	8.9	18.2
89	452	8.3	68	7.5	15.0
90	482	8.9	103	11.3	21.4
91	501	9.2	75	8.2	15.0
92	629	11.6	99	10.9	15.7
93	749	13.8	126	13.8	16.8
94	855	15.7	151	16.6	17.7
95	355	6.5	58	6.4	16.3
Total	5,434	100.0	910	100.0	

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[a] Panel A provides the frequency and percentages for the number of times the sample analysts changed brokerage houses. Panel B contains the frequency and percentages for the distribution of sample observations and turnover by calendar year. TURNOVER = 1 corresponds to an analyst moving from one brokerage house to another on Zacks, leaving the profession, or moving to a brokerage house not included on Zacks.

typical sample analyst has significant industry experience. The descriptive statistics for accuracy and industry experience when TURNOVER = 0 (panel B) are similar to those in panel A.

TABLE 2
Descriptive Statistics on Accuracy, Recommendation Profitability, Bias and Experience[a]

	Mean	*Median*	*Std. Dev.*	*N*
Panel A: Entire Sample				
ABS_ACC	−0.0113	−0.0052	0.0467	5,434
RANK_ACC	0.5708	0.5762	0.2183	5,434
ABS_PROF	0.0420	0.0249	0.2241	2,508
RANK_PROF	0.5328	0.5333	0.2895	2,508
BIAS	−0.0050	−0.0005	0.0357	5,434
INDEXP	212.73	151.00	239.11	5,434
Panel B: Subsample Where TURNOVER = 0				
ABS_ACC	−0.0111	−0.0051*	0.0503	4,524
RANK_ACC	0.5824*	0.5857*	0.2101	4,524
ABS_PROF	0.0411	0.0245	0.2213	2,144
RANK_PROF	0.5327	0.5333	0.2889	2,144
BIAS	−0.0048	−0.0004*	0.0378	4,524
INDEXP	226.20*	164.00*	246.99	4,524
Panel C: Subsample Where TURNOVER = 1				
ABS_ACC	−0.0120	−0.0059	0.0213	910
RANK_ACC	0.5129	0.5003	0.2473	910
ABS_PROF	0.0474	0.0297	0.2403	364
RANK_PROF	0.5335	0.5365	0.2932	364
BIAS	−0.0061	−0.0011	0.0217	910
INDEXP	145.79	88.00	181.05	910

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* Statistically different from the corresponding value in panel C at one-tailed probability < 0.01.

[a] Panel A provides descriptive statistics on quarterly forecast accuracy, recommendation profitability, quarterly forecast bias and industry experience for the entire sample; panel B for the subsample of analysts not changing brokerage houses (TURNOVER = 0); and panel C for the subsample of analysts changing brokerage houses (TURNOVER = 1). $ABS\_ACC_{i,t}$ is the absolute accuracy for analyst i in year t (the average MAPE for all quarterly earnings forecasts analyst i issued in year t for the firms in his primary industry, multiplied by −1); $RANK\_ACC_{i,t}$ is the rank accuracy of analyst i in year t (the analyst's fractile ranking of forecast accuracy for the firm, averaged over all firms in the analyst's primary industry); $ABS\_PROF_{i,t}$ is the absolute profitability of the stock recommendations issued by analyst i in year t (the average market-adjusted return for all stock recommendations analyst i issued in year t for the firms in his primary industry); $RANK\_PROF_{i,t}$ is the rank profitability of the stock recommendations issued by analyst i in year t (the analyst's fractile ranking of the market-adjusted returns to his stock recommendations for the firm, averaged over all firms in the analyst's primary industry); $BIAS_{i,t}$ is the forecast bias for analyst i in year t (the average bias, defined as actual earnings minus the analyst forecast, deflated by beginning-of-quarter price, for all quarterly earnings forecasts analyst i issued in year t for the firms in his primary industry); and $INDEXP_{i,t}$ is the industry experience of analyst i at the end of year t (the number of prior firm quarters the analyst issued a quarterly forecast for any firm in his primary industry). We define the accuracy and recommendation profitability measures so that high values indicate superior performance.

Comparing the table 2 descriptive statistics when analysts turn over (panel C) with analysts who do not turn over (panel B), we find consistent evidence that analysts who turn over have lower RANK_ACC and less INDEXP, some evidence that analysts turning over have lower ABS_ACC and more biased earnings forecasts (the medians for these measures are statistically different, but not the means), but no evidence of differences in ABS_PROF and RANK_PROF between the two groups.[6] Our finding for RANK_ACC is consistent with Jacob et al. (1998) who document that an analyst's mean rank accuracy in the year prior to turnover is statistically lower than the corresponding mean value for analysts not turning over.

We present univariate correlations in table 3. The Spearman correlation between TURNOVER and ABS_ACC is statistically negative (-0.045, one-tailed $p < 0.01$); the Pearson correlation is not statistically different from zero (-0.007, one-tailed $p > 0.10$). Both the Pearson and Spearman correlations between TURNOVER and RANK_ACC are statistically negative (-0.119 and -0.121, respectively, one-tailed $p < 0.01$). INDEXP and TURNOVER are also negatively correlated (Pearson correlation $= -0.126$, Spearman correlation $= -0.191$, one-tailed $p < 0.01$). All correlations between TURNOVER and the recommendation profitability measures are insignificant (see table 3). Thus, these correlations corroborate the univariate inferences we draw in table 2 between analysts who turn over and those who do not.

The Pearson (Spearman) correlation between ABS_ACC and RANK_ACC is 0.058 (0.275), statistically positive at one-tailed probability < 0.01; this finding is expected because as an analyst's absolute accuracy declines, his rank accuracy should also decline. There is also a statistically positive correlation between INDEXP and RANK_ACC, consistent with more experienced analysts being more accurate relative to their peers. In addition, more accurate analysts tend to make more profitable stock recommendations; five of the eight Pearson and Spearman correlations between forecast accuracy and stock recommendation profitability are statistically positive. However, the magnitudes of these correlations are small, suggesting that forecasting and stock-picking ability are not closely related.

IV. RESULTS

If turnover captures forced job changes and an analyst's performance evaluation includes an assessment of his forecast accuracy, we expect a negative association between forecast accuracy and turnover. To examine this relation, controlling for industry experience, we estimate the following binomial logit model:

$$\begin{aligned}\text{Prob}[\text{TURNOVER}_{i,t+1} = 1] = \text{logit}(&\alpha_0 + \alpha_1\text{ABS\_ACC}_{i,t} \\ &+ \alpha_2\text{RANK\_ACC}_{i,t} + \alpha_3\text{INDEXP}_{i,t}) \,. \qquad (1)\end{aligned}$$

where:

$\text{TURNOVER}_{i,t+1}$ = an indicator variable that equals one if analyst i changed brokerage houses in year t + 1, zero otherwise;

$\text{ABS\_ACC}_{i,t}$ = the absolute accuracy for analyst i in year t (the average MAPE for all quarterly earnings forecasts analyst i issued in year t for the firms in his primary industry, multiplied by -1);

$\text{RANK\_ACC}_{i,t}$ = the rank accuracy for analyst i in year t (the analyst's fractile ranking of his forecast accuracy for the firm, averaged over all firms in the analyst's primary industry); and

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[6] Controlling for INDEXP, there is no significant association between BIAS and TURNOVER in our sample. Further, the association between ABS_ACC and TURNOVER does not vary depending on whether the analyst is optimistic or pessimistic (results not presented).

TABLE 3
Pearson and Spearman Rank Correlations Between Variables[a]

	TURNOVER	*ABS_ACC*	*RANK_ACC*	*ABS_PROF*	*RANK_PROF*	*INDEXP*
TURNOVER		−0.007 (0.29)	−0.119 (0.01)	0.010 (0.31)	0.001 (0.48)	−0.126 (0.01)
ABS_ACC	−0.045 (0.01)		0.058 (0.01)	0.047 (0.01)	0.035 (0.04)	−0.013 (0.17)
RANK_ACC	−0.121 (0.01)	0.275 (0.01)		0.005 (0.40)	0.027 (0.09)	0.055 (0.01)
ABS_PROF	0.005 (0.41)	0.020 (0.16)	0.036 (0.04)		0.751 (0.01)	−0.013 (0.26)
RANK_PROF	0.001 (0.48)	0.023 (0.13)	0.037 (0.04)	0.828 (0.01)		0.010 (0.31)
INDEXP	−0.191 (0.01)	−0.166 (0.01)	0.079 (0.01)	0.008 (0.35)	−0.011 (0.29)	

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[a] Pearson (Spearman) correlations are above (below) the diagonal. One-tailed probability values are in parentheses. Variables are defined in table 2. We define the accuracy and recommendation profitability measures so that high values indicate superior performance. The accuracy correlations are based on a sample of 5,434 analyst-year observations; the recommendation profitability correlations are based on a sample of 2,508 analyst-year observations.

$INDEXP_{i,t}$ = the industry experience of analyst i at the end of year t (the number of prior firm quarters the analyst issued a quarterly forecast for any firm in his primary industry).

We eliminate eight outliers on the basis of the Pearson residual, which captures the effect of influential observations. This elimination does not change our results.

Ex ante, we have no evidence to suggest, which, if either, accuracy measure (i.e., absolute or relative) is used in evaluating analyst performance so we include both in equation (1). The Informativeness Principle (Holmstrom 1979) indicates that evaluating analysts on both measures is optimal if each provides incremental information about the analyst's effort. A significantly negative coefficient on RANK_ACC would be consistent with the use of relative performance evaluation for analysts. The use of relative performance evaluation appears ideal in our setting because analysts face common uncertainty, their work output is a noisy measure of their effort, and unambiguous benchmarks (e.g., actual earnings per share) and reference groups (e.g., other analysts providing forecasts for the same firm and time period) exist to evaluate their performance. Holmstrom (1982) demonstrates that in settings such as ours, relative performance evaluation results in improved risk sharing because the agent is held accountable only for those outcomes over which he has control.

The second column of table 4 presents the results from estimating equation (1). The estimated coefficient, the sensitivity estimate and the t-statistic are provided for each independent variable. The sensitivity estimate provides the change in the probability that an analyst changes brokerage houses for a one-standard-deviation change in the independent variable with the other independent variables held constant at their means.

The estimated coefficient on ABS_ACC is not significant at conventional levels ($\hat{\alpha}_1$

TABLE 4
Binomial Logit Models for Accuracy and Recommendation Profitability[a]

Equations (1) through (3):[b]

$$Prob[TURNOVER_{i,t+1} = 1] = logit(\alpha_0 + \alpha_1 ABS\_ACC_{i,t} + \alpha_2 RANK\_ACC_{i,t} + \alpha_3 INDEXP_{i,t}) \quad (1)$$

$$Prob[TURNOVER_{i,t+1} = 1] = logit(\gamma_0 + \gamma_1 ABS\_PROF_{i,t} + \gamma_2 RANK\_PROF_{i,t} + \gamma_3 INDEXP_{i,t}) \quad (2)$$

$$Prob[TURNOVER_{i,t+1} = 1] = logit(\lambda_0 + \lambda_1 ABS\_ACC_{i,t} + \lambda_2 RANK\_ACC_{i,t} + \lambda_3 ABS\_PROF_{i,t} + \lambda_4 RANK\_PROF_{i,t} + \lambda_5 INDEXP_{i,t}) \quad (3)$$

Variable	*Accuracy (Eq. (1))*	*Rec. Prof. (Eq. (2))*	*Accuracy and Rec. Prof. (Eq. (3))*
Intercept	−0.4082*	−1.3634*	−0.1827
t-statistic	−4.068	−7.873	−0.788
ABS_ACC	−0.2749		0.9184
Sensitivity	−0.0016		0.0017
t-statistic	−0.366		0.293
RANK_ACC	−1.2290*		−2.3241*
Sensitivity	−0.0335		−0.0490
t-statistic	−7.472		−7.646
ABS_PROF		0.1772	0.1322
Sensitivity		0.0045	0.0032
t-statistic		0.476	0.350
RANK_PROF		−0.0378	0.0367
Sensitivity		−0.0013	0.0012
t-statistic		−0.126	0.121
INDEXP	−0.0031*	−0.0021*	−0.0019*
Sensitivity	−0.0924	−0.0649	−0.0552
t-statistic	−10.879	−5.638	−5.003
χ^2	234.34*	42.08*	105.39*
df	3	3	5

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* one-tailed probability < 0.01.

[a] This table provides the results from estimating equations (1) through (3) for analysts who did and did not change brokerage houses during 1985 to 1995. For each variable, the estimated coefficient, sensitivity estimate and t-statistic are provided. The sensitivity estimates provide the change in the probability of turnover for a one-standard-deviation change in the independent variable with the other variables held constant at their means. We eliminate outliers on the basis of the Pearson residual.

[b] Variables are defined in table 2. We define the accuracy and recommendation profitability measures so that high values indicate superior performance.

= −0.2749, t = −0.366). Therefore, controlling for the analyst's rank accuracy and industry experience, his absolute accuracy is not significantly associated with his probability of turnover.[7] The analyst's industry experience is negatively associated with his probability of turnover ($\hat{\alpha}_3 = -0.0031$, $t = -10.879$, one-tailed $p < 0.01$). As the analyst's industry experience increases by one standard deviation, he is 9.24 percent less likely to change brokerage houses. Because most analysts cover 10–15 firms at a time, a standard deviation increase in INDEXP translates into approximately 4 to 6 years of additional forecasting experience.

In contrast to our findings for absolute accuracy, rank accuracy is negatively associated with the probability of analyst turnover; the estimated coefficient on RANK_ACC is −1.2290 ($t = -7.472$, one-tailed $p < 0.01$). As RANK_ACC decreases by one standard deviation, the analyst is 3.35 percent more likely to change brokerage houses. Because the standard deviation of RANK_ACC is approximately 0.2 (table 2), a standard deviation decrease translates into falling by one spot in rank for a firm followed by five analysts.[8] This finding compares with the weighted-average unconditional probability of 17 percent of the analyst turning over in any year in our sample. Hence, rank accuracy accounts for approximately 20 percent of the unconditional probability that an analyst changes brokerage houses in a given year. We conclude that analysts who are less accurate forecasters than their peers are more likely to turn over, consistent with relative accuracy mattering to analysts.[9]

An alternative explanation for our accuracy finding is that rank forecast accuracy is not associated with turnover, but is correlated with the profitability of an analyst's stock recommendations. To investigate this possibility, we first examine whether ABS_PROF and RANK_PROF are significantly associated with TURNOVER, controlling for industry experience, and then investigate whether RANK_ACC remains significantly associated with TURNOVER after controlling for absolute accuracy and recommendation profitability.

If turnover captures forced job changes and an analyst's performance evaluation includes an assessment of the profitability of his stock recommendations, we expect a negative association between recommendation profitability and turnover. To explore the relation between turnover and recommendation profitability, we estimate the following logit model:

$$\begin{aligned} \text{Prob}[\text{TURNOVER}_{i,t+1} = 1] = \text{logit}(&\gamma_0 + \gamma_1\text{ABS\_PROF}_{i,t} \\ &+ \gamma_2\text{RANK\_PROF}_{i,t} + \gamma_3\text{INDEXP}_{i,t}) \end{aligned} \tag{2}$$

where:

$\text{TURNOVER}_{i,t+1}$ = an indicator variable that equals one if analyst i changed brokerage houses in year t + 1, zero otherwise;

$\text{ABS\_PROF}_{i,t}$ = the absolute profitability of the stock recommendations issued by analyst i in year t (the average market-adjusted return for all stock recommendations analyst i issued in year t for the firms in his primary industry);

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[7] The estimated coefficient on ABS_ACC remains insignificant when RANK_ACC is excluded from equation (1) ($\hat{\alpha}_1 = 0.5680$, $t = 0.863$, one-tailed $p > 0.10$).

[8] The modal analyst following of our sample firms is 5.

[9] Because of time clustering in the data (table 1, panel B), we estimated equation (1) by year. In each year of the 11 years in the sample, the coefficient on ABS_ACC was not statistically significant; the coefficient on RANK_ACC was statistically negative in 9 years (and negative in the remaining 2 years). Thus, time clustering does not affect our results.

$RANK\_PROF_{i,t}$ = the rank profitability of the stock recommendations issued by analyst i in year t (the analyst's fractile ranking of the market-adjusted returns to his stock recommendations for the firm, averaged over all firms in the analyst's primary industry); and

$INDEXP_{i,t}$ = the industry experience of analyst i at the end of year t (the number of prior firm quarters the analyst issued a quarterly forecast for any firm in his primary industry).

We eliminate 11 outliers on the basis of the Pearson residual. This elimination does not change our results.

The third column of table 4 presents the results from estimating equation (2). The estimated coefficients on ABS_PROF and RANK_PROF are not significant at conventional levels ($\hat{\gamma}_1 = 0.1772$, $t = 0.476$ and $\hat{\gamma}_2 = -0.0378$, $t = -0.126$, respectively). Therefore, controlling for the analyst's industry experience, the absolute and relative profitability of his stock recommendations are not significantly associated with his probability of turnover. The relation between an analyst's industry experience and turnover is consistent with the results observed in equation (1). The higher the analyst's industry experience, the less likely he is to change brokerage houses ($\hat{\gamma}_3 = -0.0021$, $t = -5.638$, one-tailed $p < 0.01$).

To determine whether rank accuracy is associated with analyst turnover controlling for absolute accuracy, industry experience and recommendation profitability, we estimate:

$$\begin{aligned}\text{Prob}[TURNOVER_{i,t+1} = 1] = \text{logit}(&\lambda_0 + \lambda_1 ABS\_ACC_{i,t} + \lambda_2 RANK\_ACC_{i,t}\\ &+ \lambda_3 ABS\_PROF_{i,t} + \lambda_4 RANK\_PROF_{i,t}\\ &+ \lambda_5 INDEXP_{i,t}) \qquad (3)\end{aligned}$$

We eliminate 11 observations on the basis of the Pearson residual. This elimination does not affect our results.

The fourth column of table 4 contains these estimation results. Consistent with the estimation of equation (1), there is no statistically significant association between an analyst's absolute forecast accuracy and the probability of turnover ($\hat{\lambda}_1 = 0.9184$, $t = 0.293$, one-tailed $p > 0.10$). Similarly, there is no association between the probability of turnover and the analyst's absolute ($\hat{\lambda}_3 = 0.1322$, $t = 0.350$, one-tailed $p > 0.10$) or rank ($\hat{\lambda}_4 = 0.0367$, $t = 0.121$, one-tailed $p > 0.10$) recommendation profitability, consistent with the estimation results of equation (2). The estimated coefficient on RANK_ACC is still statistically negative ($\hat{\lambda}_2 = -2.3241$, $t = -7.646$, one-tailed $p < 0.01$). If the analyst's relative rank improves by one spot for a firm followed by five analysts, he is 4.90 percent less likely to change brokerage houses. If the analyst's industry experience increases by approximately five years, he is 5.52 percent less likely to turn over.

In summary, the results in table 4 indicate that the significant association between RANK_ACC and TURNOVER holds after controlling for the profitability of the analyst's stock recommendations. These results are consistent with short-run accuracy being more revealing of an analyst's effort than the short-run profitability of his stock recommendations. To investigate whether a longer horizon measure of stock recommendation profitability is associated with analyst turnover, we reestimated equations (2) and (3) including both absolute and rank recommendation profitability measures for years t and t − 1.[10] The results, not reported, are unchanged; none of the recommendation profitability measures or ABS_ACC were statistically significant, while RANK_ACC and INDEXP remained statistically negative.[11]

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[10] We use two short-term windows for the recommendation profitability measures in years t and t − 1 because the mean (median) number of calendar days between recommendation revisions in our sample is 114 (96).

V. SENSITIVITY ANALYSES

Our empirical tests demonstrate that turnover is associated with poor relative forecast accuracy. In this section, we examine the sensitivity of our conclusions by investigating whether the relation between turnover and relative accuracy in equation (1) is affected by the subsample of analysts who leave the database, the subsample of analysts who turn over multiple times, or the subsample of analysts who voluntarily turn over.[12]

Type of Turnover

The worst performing analysts with the least experience leave the database. Univariate statistics (not reported) indicate that the mean and median values of RANK_ACC and INDEXP are statistically lower for the subsample of analysts who leave Zacks than for the subsample of analysts who change to another brokerage house followed by Zacks.[13] To determine if our results in table 4 are sensitive to the inclusion of analysts leaving the database, we exclude them and reestimate equation (1). The relation between turnover and rank accuracy remains statistically negative ($\hat{\alpha}_2 = -0.8145$, $t = -2.884$, one-tailed $p < 0.01$; table 5, column 2), suggesting that analysts leaving the database are not driving our findings in table 4. Therefore, our results are valid for more than just the bottom spectrum of performers, those leaving Zacks.

Frequency of Turnover

The majority (41 percent; table 1, panel A) of the sample analysts turn over once during the sample period; 7 percent turn over more than once. To ensure that our findings in table 4 are not driven by the analysts who change jobs multiple times, we eliminate analysts turning over more than once and reestimate equation (1). The results of this estimation (table 5, column 3) indicate that there is a negative association between RANK_ACC and TURNOVER ($\hat{\alpha}_2 = -1.1808$, $t = -6.789$, one-tailed $p < 0.01$). Thus, the exclusion of analysts turning over multiple times, who represent a small fraction of our sample, does not alter our findings; there is a significant negative association between rank accuracy and turnover for analysts turning over once.[14]

Involuntary Turnover

The results of the binomial model (table 4) indicate that, on average, the probability of turnover increases as the analyst's performance declines relative to his peers. Assuming that turnover is aversive to analysts, we interpret this finding as indicating that forecast

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[11] When lagged accuracy measures (ABS_ACC_{t-1} and $RANK\_ACC_{t-1}$) are included in equation (1), the results, not reported, are unchanged. The estimated coefficients on ABS_ACC_t and ABS_ACC_{t-1} are not significantly different from zero at one-tailed probability < 0.10; the estimated coefficients on $RANK\_ACC_t$, $RANK\_ACC_{t-1}$ and INDEXP are statistically negative. Requiring current and prior year absolute and rank accuracy measures decreases the sample size to 3,518 observations.

[12] ABS_PROF and RANK_PROF are not associated with TURNOVER in these specification checks so we do not include these variables in the reported results.

[13] Estimation of an unordered multinomial logit model (not presented) supports this univariate comparison; the estimated coefficient on RANK_ACC is statistically larger for turnover off Zacks than turnover to a brokerage house on Zacks ($\chi^2(1) = 3.00$, two-tailed $p < 0.10$).

[14] Estimation of an unordered multinomial logit model (not presented) indicates that the relation between turnover and rank accuracy is also statistically negative for analysts who turn over multiple times.

TABLE 5
Sensitivity Analyses[a]

Equation (1):[b]

$$Prob[TURNOVER_{i,t+1} = 1] = logit(\alpha_0 + \alpha_1 ABS\_ACC_{i,t} + \alpha_2 RANK\_ACC_{i,t} + \alpha_3 INDEXP_{i,t})$$

			Proxy for Involuntary Turnover		
Variable	*Turnover on Database*[c]	*Turnover Once*	*Size*	*Rec. Profitability*	*Investment Business*
Intercept	−2.2060*	−0.4522*	−2.7464*	−2.7531*	−2.8464*
t-statistic	−12.755	−4.247	−10.932	−9.167	−11.545
ABS_ACC	−0.0317	0.3923	−0.7022	0.2011	−0.0870
Sensitivity	−0.0001	0.0019	−0.0008	0.0003	−0.0001
t-statistic	−0.025	0.511	−0.252	0.039	−0.044
RANK_ACC	−0.8145*	−1.1808*	−1.5710*	−1.4587*	−1.4431*
Sensitivity	−0.0104	−0.0268	−0.0088	−0.0087	−0.0084
t-statistic	−2.884	−6.789	−3.581	−2.891	−3.350
INDEXP	−0.0002	−0.0042*	0.0002	0.0002	0.0005†
Sensitivity	−0.0028	−0.1042	0.0012	0.0013	0.0032
t-statistic	−0.838	−12.324	0.555	0.567	1.937
χ^2	9.46†	282.36*	13.11*	8.91†	13.64*
df	3	3	3	3	3

* one-tailed probability < 0.01.

† one-tailed probability < 0.025.

[a] This table provides the results from estimating equation (1) for subsamples of analysts who did and did not change brokerage houses during 1985 to 1995. For each variable, the estimated coefficient, sensitivity estimate and t-statistic are provided. The sensitivity estimates provide the change in the probability of turnover for a one-standard-deviation change in the independent variable with the other variables held constant at their means. We eliminate outliers on the basis of the Pearson residual.

[b] Variables are defined in table 2. We define the accuracy and recommendation profitability measures so that high values indicate superior performance.

[c] These sample partitions are defined in section V.

accuracy matters to them. However, we are unable to determine with our data whether the analyst voluntarily or involuntarily changed brokerage houses; hence, the table 4 analysis may include analysts who voluntarily turned over. Our goal is to ensure that our findings in table 4 hold for the subsample of analysts for whom turnover is most likely to be involuntary, thereby providing justification for our conclusion that forecast accuracy matters to analysts.

We attempt to separate voluntary from involuntary turnover by examining characteristics of the previous and subsequent brokerage house employer.[15] We identify three characteristics of the previous and subsequent brokerage house, all calculated as of the year preceding the analyst's turnover: size, the profitability of all buy and strong buy recommendations issued by the brokerage house, and the dollar magnitude of investment banking business conducted by the brokerage house. We refer to these variables as proxies for brokerage house "quality" and assume that analysts turning over to "better" brokerage houses (as identified by these proxies) represent cases of voluntary turnover.

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[15] We are unable to include analysts who left Zacks in this analysis, reducing our sample size to 4,826 analyst-year observations.

Our first quality proxy, size, is the number of analysts affiliated with a brokerage house who issue quarterly earnings forecasts during the year on Zacks. This proxy assumes that larger brokerage houses attract and retain better talent.

The second quality measure is motivated by anecdotal business press evidence suggesting that brokerage houses attracting better talent have more profitable buy recommendation lists (Dorfman 1997). To measure the profitability of the brokerage house's buy recommendation list, we collect the new strong buy or buy recommendations issued by the brokerage house in the year preceding turnover from Zacks and calculate the market-adjusted return (defined in section III) over days (0, +30) for each of these recommendations.[16] Recommendation data are available from Zacks beginning in 1989, reducing the sample for this proxy to 3,476 analyst-year observations.

Our final quality proxy is the dollar magnitude of investment banking business executed by the brokerage house. A firm that attracts a significant amount of investment banking business may compensate analysts more highly than firms without this business. We measure investment-banking business for a brokerage house as the total dollar amount of U.S. debt and equity offerings in which the brokerage house acted as lead underwriter in the year before turnover as reported on the Securities Data Corporation database.

Results for equation (1) after eliminating instances identified as possible cases of voluntary turnover are presented in columns 4 through 6 of table 5. Regardless of the measure of brokerage house quality, the estimated coefficient on ABS_ACC is not statistically significant. INDEXP is significant in only one specification and with a sign opposite that of our previous analyses; analysts with more industry experience are more likely to turn over to brokerage houses with less investment banking business. The estimated coefficient on RANK_ACC is statistically negative for all three quality proxies. Therefore, our findings in table 4 hold for the subsample of observations where it is likely that turnover is involuntary, supporting our conclusion that forecast accuracy matters to analysts.

VI. CONCLUSION

We provide evidence on the importance of earnings forecast accuracy to analysts by examining the relation between absolute and relative forecast accuracy and turnover, controlling for factors known to affect accuracy: firm- and time-period effects, forecast horizon and industry forecasting experience. Ideally, to test if analysts have incentives to improve their absolute or relative forecast accuracy, we would examine if the analyst's salary or yearly bonus is related to his forecast accuracy; however, these data are not publicly available.

Our results suggest that analysts with lower accuracy relative to other analysts following the same firm who concentrate in the same industry have a higher probability of turnover. We find a 3.35 percent increased probability of turnover given a one-standard-deviation decrease in relative accuracy; this amount accounts for approximately 20 percent of the unconditional probability of an analyst turning over on Zacks in any year from 1985 to 1995. We find no association between absolute accuracy and/or absolute or relative recommendation profitability and turnover; further, relative accuracy remains statistically significant in all our empirical specifications when these three other performance measures are included.

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[16] The results hold if we compound the returns over days (0, +60).

We interpret our findings as suggesting that forecast accuracy matters to security analysts. Our results, however, based on a sample of analysts tracking large, heavily followed firms, may not generalize to the entire population of analysts. Further, our interpretation of our results relies on assuming that turnover is aversive to analysts and thus captures their incentives regarding their observable work output.

REFERENCES

Brown, L., L. Hagerman, P. Griffin, and M. Zmijewski. 1987. Security analyst superiority relative to univariate time-series models in forecasting quarterly earnings. *Journal of Accounting and Economics* 9: 61–87.

Clement, M. 1998. Analyst forecast accuracy: Do ability, resources, and portfolio complexity matter? Working paper, University of Texas at Austin, TX.

Dechow, P., A. Hutton, and R. Sloan. 1997. The relation between analysts' long-term earnings growth forecasts and stock price performance following equity offerings. Working paper, University of Michigan, Ann Arbor, MI and Harvard University, Boston, MA.

Dorfman, J. 1991. Analysts devote more time to selling as firms keep scorecard on performance. *Wall Street Journal* (October 29): C1.

———. 1997. For stock-picking, "New York, New York" is drowned by regional brokers' chorus. *Wall Street Journal* (February 12): C1.

Dugar, A., and S. Nathan. 1995. The effect of investment banking relationships on financial analysts' earnings forecasts and investment recommendations. *Contemporary Accounting Research* 12: 131–160.

Eccles, R., and D. Crane. 1988. *Doing Deals: Investment Banks at Work.* Boston, MA: Harvard Business School Press.

Francis, J., and D. Philbrick. 1993. Analysts' decisions as products of a multi-task environment. *Journal of Accounting Research* 31: 216–230.

Heitner, P. 1991. Isn't it time to measure analysts' track records? *Financial Analysts Journal* 47: 5–6.

Holmstrom, B. 1979. Moral hazard and observability. *Bell Journal of Economics* 10: 74–91.

———. 1982. Moral hazard in teams. *Bell Journal of Economics* 13: 324–340.

Jacob, J., T. Lys, and M. Neale. 1998. Experience, expertise and the forecasting performance of security analysts. Working paper, University of Colorado, Denver, CO, Northwestern University, Evanston, IL, and Stanford University, Stanford, CA.

Mikhail, M., B. Walther, and R. Willis. 1997. Do security analysts improve their performance with experience? *Journal of Accounting Research* 35: 131–157.

Morgenson, G. 1997. See no evil; speak no evil. *Forbes* (December 15): 162–167.

O'Brien, P. 1988. Analysts' forecasts as earnings expectations. *Journal of Accounting and Economics* 10: 53–83.

Wiegold, C. 1998. Industry by industry: A talk with the top stock pickers. *Wall Street Journal* (June 30): R2.

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Pricing Initial Audit Engagements: A Test of Competing Theories

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ABSTRACT: Two competing theories of initial engagement audit pricing are examined empirically. DeAngelo's (1981a) model predicts initial engagement discounts in all settings, while Dye's (1991) model specifically predicts discounting will *not* occur in settings where audit fees are publicly disclosed. Unlike the United States and most countries, audit fees are publicly disclosed in Australia. Our study examines initial engagement pricing in Australia during a time period when comparable U.S. studies report discounts of 25 percent (Ettredge and Greenberg 1990; Simon and Francis 1988). The Australian evidence finds initial engagement discounting only for upgrades from non-Big 8 to Big 8 auditors. Discounting for upgrades to Big 8 auditors is consistent with economic theories of discount pricing by sellers of higher-priced, higher-quality *experience* goods as an inducement to purchase when uncertainty about product quality is resolved through buying (experiencing) the goods. The evidence in our study is generally consistent with Dye's (1991) conclusion that public disclosure of audit fees precludes initial engagement discounting and the potential independence problems arising from such discounting.

Key Words: *Audit pricing, Initial audit engagements, Lowballing, Auditor Independence.*

Data Availability: *All data are available from public sources.*

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I. INTRODUCTION

This paper examines initial engagement audit pricing in Australia. The study is motivated by disagreement in the conclusions of analytical work on audit pricing (DeAngelo 1981a; Dye 1991). DeAngelo (1981a) argues that initial engagement discounts arise from transaction costs (client switching costs and auditor start-up costs) which give incumbent auditors a cost advantage over competitors, allowing incumbents to set future fees above their avoidable costs and thereby earn rents.[1] Audit markets are assumed to be contestable and audit firms competitively bid for the right to earn these future rents, which results in initial engagement discounts. The implication of DeAngelo's (1981a, 126) analysis is that initial engagement discounts are sunk costs and therefore have no necessary effect on auditor independence in future periods.

Dye (1991) shows that initial engagement discounts in DeAngelo's (1981a) model are not caused by transaction costs. Instead, the discount is due to her *assumption* that auditors have all of the bargaining power with respect to setting future-period fees. Dye (1991, 349) argues that if clients have all of the bargaining power they would insist auditors charge no more than the avoidable cost of the audit, in which case there would be neither future rents nor initial engagement discounts. Dye (1991) then endogenizes the bargaining relationship between client and auditor to analyze its effect on auditor independence and fees. He concludes that auditors are perceived by outsiders to be most independent when no future quasi-rents are received from clients, and this is the case when quasi-rents are publicly observable. Dye (1991) argues that quasi-rents can be inferred from the disclosure of audit fees and that such disclosure will deter quasi-rents because of outsiders' perceptions that quasi-rents impair auditor independence and reduce the reliability of financial statements. However, when quasi-rents (audit fees) are not publicly observable the client has an incentive to pay positive quasi-rents to influence the favorableness of the audit report, which leads to initial engagement discounts and the possible impairment of auditor independence in future periods. Dye (1991) thus concludes that initial engagement discounting is driven by the nonobservability of quasi-rents (information about audit fees) rather than the existence of transaction costs.

Dye (1991, 363) also suggests that one can empirically distinguish between his model and DeAngelo's (1981a) by comparing initial engagement audit fees in settings where fees are publicly disclosed and those in which they are not. If transaction costs drive discounts, the audit fee disclosure regime should not matter and one should observe comparable discounting in both regimes. Alternatively, if Dye's (1991) "informational" explanation is correct, discounting will occur only when audit fees are private information. Audit fees are not generally publicly disclosed in the United States. However, several studies—mostly relying on audit fee data collected from private surveys—have reported significant discounts for initial audit engagements. The most persuasive evidence comes from two studies using large samples from the early to mid-1980s. Ettredge and Greenberg (1990) analyze 389 initial engagements from 1983–1987, and Simon and Francis (1988) analyze 214 initial engagements from 1979–1984, with both studies reporting an initial engagement discount of around 25 percent.[2]

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[1] DeAngelo (1981a) calls these quasi-rents because they may be bid away through initial engagement discounts in which case there is no economic rent (monopoly profit).

[2] Significant fee discounts in the United States are reported in five other studies using smaller samples: Baber et al. (1987), Deis and Giroux (1996), Francis and Simon (1987), Pearson and Trompeter (1994) and Turpen (1990). Fee discounts have also been induced in laboratory market settings (Dopuch and King 1996; Schatzberg 1990; Schatzberg and Sevcik 1994). However, there is some counterevidence as five U.S. studies and one Canadian study fail to find significant fee discounts (Barefield et al. 1993; Chung and Lindsay 1988; Palmrose 1986; Rubin

(*Continued on next page*)

Audit fees have been publicly disclosed in Australia since the early 1970s. Our study examines initial engagement pricing in Australia for a sample of 224 initial engagements from the mid-1980s, a time period comparable to the above-cited U.S. studies.[3] The empirical results reveal that no significant discounts occur for three of four distinct types of initial audit engagements. Specifically, no discounts are observed for initial engagements arising from (1) within Big 8 auditor changes, (2) within non-Big 8 auditor changes and (3) changes from Big 8 to non-Big 8 auditors. Fee discounts are observed only for the fourth category of initial engagements: changes from a non-Big 8 to Big 8 auditor. Thus the preponderance of the Australian evidence is inconsistent with DeAngelo's (1981a) analysis that initial engagement discounting arises from transaction cost advantages of the incumbent auditor. The Australian data are, for the most part, consistent with Dye's (1991) prediction that initial engagement discounting will not occur if audit fees are publicly disclosed.

The models in DeAngelo (1981a) and Dye (1991) do not explain why discounts would be observed in Australia only for changes from non-Big 8 to Big 8 auditors. Both models make across-the-board predictions about the presence (or absence) of discounts for all types of initial engagements. We draw on the economic concept of *experience goods*, a concept outside the scope of analytical audit pricing research, to suggest an explanation for this result. Experience good theory posits discount pricing by sellers of higher-priced, higher-quality *experience goods* (like Big 8 audits) as an inducement to purchase such goods when uncertainty over product quality is resolved through buying (experiencing) the goods. This explanation captures two salient features of the audit market absent in the analytical models of Dye (1991) and DeAngelo (1981a): the existence of more than one level of audit quality and the product uncertainty that is created with respect to audit quality when there is more than one level of quality.

II. RESEARCH METHOD AND DATA

Model Specification

The cross-sectional audit fee regression model developed in prior Australian audit fee research (Craswell et al. 1995; Francis 1984) is used to test Dye's (1991) prediction of no initial engagement discounts in the presence of publicly disclosed audit fees.[4] Audit fee models use a set of variables to control for cross-sectional differences in factors that affect fees such as client size, audit complexity and auditor-client risk sharing (Simunic 1980). These models have demonstrated good explanatory power (R^2s of 0.70 and higher) and have been robust across different samples, time periods, countries and to sensitivity analyses for model misspecification (Chan et al. 1993; Francis and Simon 1987).

Footnote 2 (Continued)
1988; O'Keefe et al. 1994; Simunic 1980). On balance the evidence is more supportive (than not) of discounting, although one of the referees notes that these studies have potential measurement error and sample bias because the audit fee data are usually collected by surveys and have low response rates.

[3] Two prior Australian studies fail to find evidence of discounts, although both studies have small samples of initial engagements. Francis (1984) has 26 initial engagements from a random sample of Australian companies, and Butterworth and Houghton (1995) have 37 initial engagements from a sample of companies headquartered in the state of Western Australia.

[4] Dye's (1991) model assumes audit fees perfectly reveal quasi-rents and that no discounting occurs in a setting like Australia where audit fees are publicly disclosed. However, it is also possible that audit fees will not perfectly reveal quasi-rents and that some discounting on initial engagements will occur. While not tested in our study, a weaker prediction from Dye's (1991) model is that discounting may occur when fees are publicly disclosed, but will be less in magnitude compared to countries (like the United States) where audit fees are not publicly disclosed.

To test for differential pricing on initial engagements, an indicator variable is added to the audit fee model to identify initial engagements of companies changing auditors. This is the research design used by Simon and Francis (1988) and tests for initial engagement discounts by a cross-sectional comparison of audit fees from *initial vs. continuing* audit engagements, after controlling for other factors affecting fees. Formally, the test determines if, *ceteris paribus*, there is a significant and negative intercept shift in the fitted regression model for initial audits compared to continuing engagements.

The OLS regression model to be estimated is specified as:

$$\begin{aligned} \text{LAF} = {} & b_0 + b_1\text{LTA} + b_2\text{SUBS} + b_3\text{FOR} + b_4\text{CATA} + b_5\text{QUICK} + b_6\text{DE} + b_7\text{ROI} \\ & + b_8\text{OPIN} + b_9\text{YE} + b_{10}\text{LOSS} + b_{11}\text{BIG 8} + b_{12}\text{INITIAL} + e \end{aligned}$$

where:

LAF = natural log of total audit fees ($ thousands);
LTA = natural log of total assets ($ millions);
SUBS = square root of the number of subsidiaries;
FOR = proportion of subsidiaries that represent foreign operations;
CATA = ratio of current assets to total assets;
QUICK = ratio of current assets (less inventories) to current liabilities;
DE = ratio of long-term debt to total assets;
ROI = ratio of earnings before interest and taxes to total assets;
OPIN = indicator variable (1 = qualified opinion);
YE = indicator variable (1 = non-June 30th fiscal year end);
LOSS = indicator variable (1 = loss in any of past three years);
BIG 8 = indicator variable (1 = Big 8 auditor); and
INITIAL = experimental indicator variable (1 = initial audit engagement).

The experimental variable INITIAL allows a comparison with prior studies. A second model specification uses four separate initial engagement indicator variables to determine if initial engagement pricing is consistent across different categories of auditor switches. The sample is from the mid-1980s and the familiar Big 8/non-Big 8 dichotomy is used to classify auditor changes as one of four distinct types: (1) within Big 8 changes (from one Big 8 auditor to another); (2) within non-Big 8 changes (from a non-Big 8 auditor to another); (3) upgrades from non-Big 8 to Big 8 auditors; and (4) downgrades from Big 8 to non-Big 8 auditors. The auditing research literature contains considerable evidence of perceived and actual differences between Big 8 and non-Big 8 auditors, with Big 8 auditors producing a level of quality that exceeds both minimum professional requirements and the quality of non-Big 8 auditors (see Beatty 1989; Craswell et al. 1995; Francis and Krishnan 1999; Francis and Wilson 1988; Palmrose 1988; Teoh and Wong 1993). The analytical models of Dye (1991) and DeAngelo (1981a) are silent about the possible effects of differential audit quality. Because only one level of quality is specified in their models, across-the-board predictions are made about initial engagement pricing for all types of auditor changes. Analyzing the above four types of auditor changes will provide descriptive evidence on whether differential auditor quality, measured by the Big 8/non-Big 8 dichotomy, has an effect on initial engagement pricing.

With respect to the 11 control variables, the expected signs are positive for the following variables: client size (LTA), two of the audit complexity variables (SUBS and FOR), audit risk variables measured by leverage and the magnitude of current assets (DE and CATA) and the use of Big 8 (BIG 8) auditors (Francis 1984; Simunic 1980). A positive sign is also expected for OPIN as prior studies document higher fees associated with modified opinions, possibly due to more investigative effort in such circumstances. Negative signs are expected for the variables QUICK, ROI, LOSS and YE. QUICK is an audit risk variable and firms with a lower value are riskier (less liquid) and therefore are expected to have higher audit fees. Prior studies find that firms with higher ROI have lower fees, which is consistent with auditor-client risk sharing, i.e., more profitable clients assume more of the total risk that is shared between the auditor and client; firms with losses (LOSS) have lower fees, possibly due to an inability to pay higher fees; and firms with off-peak fiscal year ends (YE) have lower fees.

The Sample and Data

Australian companies are required by law to disclose in annul reports the audit fees paid to auditors. The data used to estimate the model are from fiscal 1987 and are obtained from the *Who Audits Australia?* database (Craswell 1988), supplemented with data from annual reports. The sample size is 1,468 observations which comprises most companies listed on Australian Stock Exchanges in 1987.[5] Of these 1,468 companies, 851 (58 percent) are audited by Big 8 auditors and 617 (42 percent) by non-Big 8 auditors. The Australian audit market in the mid-1980s was competitive and comparable to the United States during that period. Of particular importance is the fact that the accounting profession's formal restrictions on client solicitation and advertising were eliminated both in the United States and Australia prior to the studies of initial engagement pricing.[6]

Initial audit engagements arising from auditor changes are identified from the *Who Audits Australia?* database and verified by reference to companies' annual reports to adjust for audit firm mergers and changes of auditor name. A total of 129 auditor switches in 1987 is initially identified, which represents 9 percent of the total sample. In order to increase the number of initial engagements, 95 initial audits from 1985 and 1986 are identified and added to the 1987 switches to give a final sample of 224 initial audits.[7]

The 224 auditor changes are classified as follows: (1) 40 within Big 8 changes; (2) 74 within non-Big 8 changes; (3) 80 upgrades from non-Big 8 to Big 8 auditors; and (4) 30 downgrades from Big 8 to non-Big 8 auditors. There are 1,244 continuing engagements representing companies not switching auditors over the period 1985–1987. Data for all variables are from fiscal 1987 financial statements, with the exception of the 1985 and 1986 initial audit engagements, which use data from 1985 and 1986, respectively.

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[5] The original database has 1,569 companies with 101 observations deleted for the following reasons: 8 are not publicly listed companies, 31 have overseas auditors, 16 have unusual reporting periods exceeding 12 months, 35 have incomplete data, and 9 do not have a history of auditing against which to assess whether an auditor change occurs.

[6] Deregulation of the audit market occurred in the United States in 1979 and the studies by Simon and Francis (1988) and Ettredge and Greenberg (1990) use samples drawn from the immediately subsequent periods of 1979–1984 and 1983–1987, respectively. In Australia comparable deregulation occurred in 1982, and the sample here comes from the subsequent period 1985–1987.

[7] The reason for adding additional auditor switches from 1985 and 1986 is to expand the sample size in the study, especially for model 2 (table 2) which uses four separate initial audit indicator variables. We are concerned about the potential low power of the statistical tests, particularly given the prediction of no discounting. Pooling several years of switches is typically done to increase samples sizes (e.g., Ettredge and Greenberg 1990; Simon and Francis 1988). To assess the effect of adding the additional switches from 1985 and 1986, model 2 in table 2 is re-estimated using just the 129 initial engagements from 1987. The t-statistic on upgrades is -2.71 which is significant at $p < 0.01$, while the other three categories of initial engagements are insignificant with p-values on the t-statistics ranging from 0.14 to 0.32. Thus, there is no indication that pooling initial engagements from 1985–1987 biases the estimations.

Descriptive Statistics

Descriptive statistics for the model variables are reported in table 1 for the full sample of 1,468 observations, the 1,244 control companies which did not change auditors over the period 1985–1987 and the 224 experimental companies which changed auditors between 1985 and 1987. Compared to the control group, companies changing auditors were significantly smaller (LTA); less liquid (QUICK); more likely to have a qualified audit report (OPIN); and more likely to have reported a loss in any of the three previous years (LOSS).[8]

III. EMPIRICAL RESULTS

Two regression models are reported in table 2. Both models have F-ratios that are significant at $p<0.01$, have good explanatory power with adjusted R^2s of 0.76, have normally distributed residuals with no indication of heteroscedasticity problems and are not affected by individual influential observations.[9] The 11 control variables have the expected signs and are significant at $p<0.01$ except for two insignificant variables: FOR (foreign subsidiaries) and YE (off-peak fiscal year ends). These results are consistent with prior Australian studies (Francis 1984; Craswell et al. 1995). In addition, none of the four initial audit indicator variables are highly correlated with the 11 control variables: only seven of these 44 correlation statistics are significant at $p<.01$, and largest of these has a Pearson correlation coefficient of only 0.17.[10] This means that multicollinearity is unlikely to be a problem or to affect the statistical significance of the initial audit indicator variables.

Model 1 in table 2 is estimated with a single indicator variable for all initial audit engagements and permits a direct comparison with prior studies. Initial engagement audit fees are lower than continuing engagement fees. The initial audit variable has a parameter estimate of –0.104 and is significant at $p<0.06$, which implies a fee discount of 10 percent using the estimation procedure described in Simon and Francis (1988).[11] This is less than the 25 percent discount in the United States reported in Ettredge and Greenberg (1990) and Simon and Francis (1988). However, as reported below, the Australian discount is driven solely by one category of initial audit engagements: upgrades from non-Big 8 to Big 8 auditors.

Model 2 in table 2 reports initial engagement pricing for the four separate categories of auditor switches discussed in section II. Model 2 shows there is no significant discounting ($p<0.10$) for three of four categories relative to ongoing audit engagements: within Big 8 auditor changes, within non-Big 8 auditor changes and downgrades from Big 8 to non-Big 8 auditors. However, there is significant discounting in the remaining category: upgrades from non-Big 8 to Big 8 auditors. The parameter estimate for upgrades is –0.362 which is

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[8] Univariate statistics are available from the authors on request. While there are some differences in the set of variables between the experimental and control groups, the purpose of the audit fee model is to control for these systematic differences across the observations in the sample. Based on prior studies there is no reason to believe this is not the case here (e.g., see Francis and Simon 1987). However, a further sensitivity analysis is reported in section V with respect to the variables LTA (size) and LOSS.

[9] Using the procedure described in Belsey et al. (1980, 28), 26 influential observations are identified. The regression models in table 2 are unchanged with respect to the statistical significance of the initial audit indicator variables when these 26 observations are deleted.

[10] Because the initial audit variables are dichotomous rather continuous, we also calculate t-tests (for continuous control variables) and Chi-square tests (for dichotomous control variables) as alternatives to Pearson correlations. These alternative tests identify six significant differences ($p<.01$), four of which are the same as identified by the Pearson correlations.

[11] The procedure derives the impact of the intercept reduction on the dependent variable (which is the natural log of audit fees). This is defined as $1 - (1/e^z)$, where z is the intercept shift for initial audits (Simon and Francis 1988, 263).

TABLE 1
Descriptive Statistics[a] for Variables in Regression Fee Model

	Full Sample (n = 1,468)		*Continuing Audits[b] (n = 1,244)*		*Initial Audits[c] (n = 224)*	
Variable	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*
Continuous Variables:						
AF	100.421	344.863	106.523	362.290	66.537	222.287
LAF	3.127	1.496	3.144	1.532	3.034	1.279
TA	286.655	2890.617	325.564	3137.564	70.567	213.138
LTA	9.981	1.824	10.005	1.876	9.846	1.498
SUBS	2.277	2.406	2.240	2.422	2.484	2.311
FOR	0.477	1.232	0.479	1.266	0.465	1.028
CATA	0.388	0.247	0.393	0.249	0.361	0.237
QUICK	5.730	17.573	6.116	18.766	3.585	7.948
DE	0.084	0.179	0.084	0.180	0.086	0.174
ROI	0.010	0.228	0.016	0.230	−0.024	0.216
Categorical Variables:						
OPIN (Qualified)	28%		25%		41%	
YE (non-June 30)	16%		16%		16%	
LOSS (Yes)	28%		23%		53%	
BIG 8 (Yes)	58%		59%		54%	

[a] All dollar information is in Australian dollars with \$1.00 Australia = \$0.72 U.S. in 1987.
[b] Data for continuing audit firms is from 1987.
[c] Data for initial audit firms is from 1985–1987 (with 129 firms being from 1987).

Variable Definitions:
AF = total audit fees (\$ thousands);
LAF = natural log of total audit fees (AF);
TA = total assets (\$ millions);
LTA = natural log of total assets (TA);
SUBS = square root of the number of subsidiaries;
FOR = proportion of subsidiaries that are foreign;
CATA = ratio of current assets to total assets;
QUICK = ratio of current assets minus inventories, to current liabilities;
DE = ratio of long-term debt to total assets;
ROI = ratio of earnings before interest and tax to total assess;
OPIN = indicator variable, qualified = 1;
YE = indicator variable, non-June 30 balance date = 1;
LOSS = indicator variable, reported loss in any of last three years = 1;
BIG 8 = indicator variable, Big 8 auditor = 1.

significant at $p<0.01$ and represents an average discount of 30.4 percent.[12] None of the prior U.S. studies estimate a model comparable to model 2. However, Simon and Francis (1988) report a sensitivity analysis in which one test is restricted to a subsample of same-tier auditor switches, i.e., Big 8 to Big 8, second-tier national firm to second-tier national

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[12] In the only other study to conduct such a test, Gregory and Collier (1996) report a comparable discount of 34 percent for a small sample of 23 upgrades to Big 8 auditors in the United Kingdom from the period 1987–1991.

TABLE 2
Audit Fee Regression Models Using Big 8 and All Non-Big 8 Auditors
(Dependent Variable is Natural Log of Audit Fee)

	Model 1			*Model 2*		
Variable[a]	*Estimate*	*t-stat.*	*Prob.*[b]	*Estimate*	*t-stat.*	*Prob.*[b]
Control Variables:						
Intercept	−1.830	−11.80	0.0001	−1.851	−11.98	0.0001
LTA (+)	0.403	24.49	0.0001	0.401	24.51	0.0001
SUBS (+)	0.260	17.99	0.0001	0.257	17.88	0.0001
FOR (+)	−0.031	−1.41	0.9208	−0.026	−1.19	0.8827
CATA (+)	0.587	7.20	0.0001	0.583	7.19	0.0001
QUICK (−)	−0.009	−8.19	0.0001	−0.009	−8.18	0.0001
DE (+)	0.349	3.12	0.0010	0.352	3.15	0.0008
ROI (−)	−0.371	−4.06	0.0001	−0.369	−4.05	0.0001
OPIN (+)	0.191	4.38	0.0001	0.204	4.69	0.0001
YE (−)	0.027	0.50	0.6928	0.028	0.53	0.7022
LOSS (−)	−0.139	−3.11	0.0010	−0.138	−3.09	0.0010
BIG 8 (+)	0.270	6.89	0.0001	0.330	7.78	0.0001
Initial Engagement (Auditor Switch) Indicator Variables:						
Initial Audit (?)	−0.104	−1.88	0.0597			
Upgrades to Big 8 Auditors (?)				−0.362	−4.12	0.0001
Downgrades to Non-Big 8 Auditors (?)				0.225	1.63	0.1033
Within Non-Big 8 Auditor Changes (?)				0.054	0.59	0.5546
Within Big 8 Auditor Changes (?)				−0.117	−0.97	0.3196
Sample size		1468			1468	
F-statistic		394.68			319.98	
Adjusted R^2		0.76			0.76	

[a] Variables are defined in table 1, and expected signs are noted in parentheses.

[b] All p-values for the control variables are one-tailed probabilities, while those for the initial engagement (auditor switch) indicator variables are two-tailed probabilities.

firm and local firm to local firm. In this test, between-tier switches (including upgrades from non-Big 8 to Big 8 auditors) are thus excluded from the sample. They report that discounting occurs in this subsample which means their full sample result is not driven by discounts arising solely from upgrades to Big 8 auditors, as is the case reported here in table 2.

IV. AUDITS AS EXPERIENCE GOODS

The results in model 2 are inconsistent with DeAngelo's (1981a) analysis and supports Dye's (1991) prediction of no discounting for initial audit engagements, with the exception of upgrades from non-Big 8 to Big 8 auditors. An economic explanation exists for the observed discounting of upgrades to Big 8 auditors that does not rely on arguments made in the analytical accounting literature. According to the economic theory of experience goods, discount pricing will occur when potential buyers of higher-priced, higher-quality goods (like Big 8 audits) are uncertain with respect to quality prior to purchase, and sellers respond to this uncertainty by discounting prices as an inducement to purchase. Importantly, experience good theory can be tested in Australia but not in the U.S. audit market where the test would be potentially confounded by discounting due to the existence of quasi-rents.

The experience-good literature begins with a standard economic argument that rational consumers need information on price and quality prior to purchase in order to make informed decisions. Information on the price of alternative brands is obtainable by incurring search costs (Stigler 1961). With respect to assessing the quality of alternative brands, Nelson (1970) and Wilde (1981) make a distinction between two types of goods. The first type is a *search good* in which quality, like price, is assessed by search prior to purchase. Typically this occurs through direct inspection of goods but it can also occur through secondary sources such as product rating publications like *Consumer Reports*. The second type of good is an *experience good* in which quality is not readily determinable by search prior to purchase but is instead bundled with the good itself and is learned through direct experience with the good (Shapiro 1983, 497).

Auditing can be characterized as an experience good as have other professional services such as law and medicine (Weimer and Vining 1992, 71). Prior to purchase, consumers can determine price but not the quality of audits. This is consistent with the long-standing claim that audit quality is costly and difficult to assess *ex ante* (DeAngelo 1981b, 186). To some extent, the "branding" achieved by Big 8 accounting firms has created two well-defined tiers or classes of accounting firms, with brand name providing some information about the general level of audit quality that can be expected relative to that of non-Big 8 firms (Novak 1998). However, the actual quality of an audit from a specific Big 8 accounting firm is ultimately assessable by the buyer only after the audit is performed. Buyer uncertainty about a Big 8 audit could stem from either uncertainty about the quality of the service or from uncertainty that the higher-quality service is of sufficient value to warrant the higher cost (once fees are raised to normal levels).[13]

Shapiro (1983) and Tirole (1988) analyze the two key problems facing suppliers of higher-priced, higher-quality experience goods: (1) how to induce consumers to try the product, given quality uncertainty; and (2) the extent to which price is a signal of quality (Tirole 1988, 110–111). These two issues are clearly interrelated. The most obvious way to encourage consumers to try a product is to charge a lower price in the introductory period. However, this creates two further problems. First, the consumer may be unwilling to purchase the good if a lower price is interpreted as a signal of low quality and second, the supplier must subsequently be able to raise the price to the appropriate level given the higher quality of the good. With respect to Big 8 audits, the first problem is mitigated to some extent if brand name reputations are strongly established, as appears to be the case with Big 8 accounting firms. The second problem can be overcome since repeat (annual) purchases of audits provide a means of learning about quality through experience, which allows suppliers to raise prices in subsequent periods.[14] Discount pricing of upgrades is evident in table 2 and is consistent with experience-good pricing. The magnitude of the discount is 30 percent, which is approximately equal to the normal Big 8 premium.[15]

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[13] The analysis focuses on upgrades to Big 8 auditors because this is the setting analogous to the experience-good literature. We assume a downgrade from a higher-quality Big 8 auditor to a lower-quality (and less expensive) non-Big 8 auditor does not create uncertainty for buyers. The buyer is paying less and expects less. Within Big 8 and within non-Big 8 auditor changes involve changes to the similar types of auditors in which case there would be familiarity with the service quality expected from the new auditors.

[14] Consistent with this argument, the data in table 4 later in the paper show that audit fees return to "normal levels" by the second year, indicating that discounting occurs only in the initial period in which there is quality uncertainty.

Buyers of audits purchase a number of product attributes and the experiential nature of audit quality is not necessarily applicable to all attributes. Simunic and Stein (1987) suggest audits have two primary attributes: credibility and control. The credibility attribute derives from the *public* report issued by the auditor on the financial statements. The demand for credibility can be explained by agency theory and is primarily of value to external parties such as shareholders and creditors (Watts and Zimmerman 1983). In contrast, the control attribute is based on *private* reports by auditors to managers during the course of an engagement. These private reports are primarily of value to managers in evaluating operating performance and internal control systems.

Auditor reputations are more easily established for the standardized task of public reporting on the credibility of financial statements than for the less routine task of private reporting to managers on internal operating performance and control systems. Thus, an upgrade from a non-Big 8 to a brand name Big 8 auditor may have relatively little product uncertainty in terms of the *credibility* dimension of auditing. However, a Big 8 auditor's value-added for private reports on operations/controls is more likely to be uncertain until the client actually experiences the quality of the auditor's work.[16] For experience-good pricing to be applicable to auditing, it is only necessary that some significant portion of the audit have the product characteristics of an experience good, and the auditor's value-added for private reports on operating performance and control systems is likely to have such characteristics.

These arguments about the internal (private) demand for audits and the experiential nature of audit quality are also consistent with surveys of chief financial officers by Carcello et al. (1992) and Behn et al. (1997). Carcello et al. (1992) report that perceptions of audit quality are closely linked to the specific members of the audit team and the audit team's personal experience with the client and the client's industry. Behn et al. (1997) report that client satisfaction with auditors is strongly affected by auditors' responsiveness to clients and active personal involvement by engagement partners. Accounting firms recognize this and have developed a "customer focus" that emphasizes the value-added of their services to clients. An example of this orientation can be found in the annual "Novak Client Perception Survey" (*Accounting Today* 1997). The survey is jointly sponsored by the Big 6 accounting firms and the purpose is to measure customer satisfaction of controllers and chief financial officers with the quality of the work performed by auditors. The existence of such surveys illustrates the inherent uncertainty between buyers and sellers over audit firm quality and the desire by accounting firms for feedback with respect to the quality of their performance as perceived by the managers who hire (and fire) auditors.

V. ADDITIONAL ESTIMATIONS

Additional analyses are reported in this section to address various factors that potentially affect the reliability of the primary results reported in table 2.

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[15] The parameter value is 0.330 for the variable BIG 8 in model 2, table 2, which represents an average premium of 28 percent for Big 8 auditors. The upgrade parameter indicates a discount on the normal Big 8 fee of 30 percent. In other words, the discounted Big 8 fee for upgrades is approximately equal to the fee of non-Big 8 auditors which suggests that Big 8 auditors basically forgo their normal premium in the first year while the client experiences the quality provided by the Big 8 auditor.

[16] Simunic and Stein (1987) suggest a third product attribute associated with audits, *scope of services*, which refers to an accounting firm's ability to provide consulting services in addition to the audit. Consulting is similar to the control dimension because consulting services are less routine than audits and also result in private reports to managers.

Company Size

Prior audit fee research has shown that audit fee model specification is sensitive to company size (Craswell et al. 1995). For this reason, models 1 and 2 are re-estimated on partitions of the upper/lower halves of the sample based on median total assets. For models 1 and 2, parameter estimates and t-statistics for the initial audit indicator variables display no qualitative differences across the two subsamples. In model 1, the initial engagement variable is negative and significant, and in model 2, the only significant category is an upgrade from non-Big 8 to Big 8 auditors. The re-estimation of model 2 results in parameter estimates for upgrades of –0.343 for the "large" subsample and –0.372 for the "small" subsample, both of which are significant at $p<0.01$. These estimates correspond to fee discounts of 29 percent and 31 percent, respectively. Thus, there is no indication the model is misspecified across the spectrum of company size in the Australian audit market.

Long-Term Debt

A possible explanation for no initial engagement discounting (except upgrades) is that companies with higher levels of long-term debt have greater agency costs and therefore less bargaining power with their auditors over fees. If true, one would expect to see high-debt firms driving the statistical results in table 2. To test this conjecture, the sample is partitioned into "high" and "low" debt firms using the median value of DE (ratio of long-term debt to total assets). For both subsamples, the results are comparable to those reported in table 2. In model 1, the initial audit variable is negative and significant, while, in model 2, only upgrades from non-Big 8 to Big 8 auditors have negative and significant coefficients. The re-estimation of model 2 results in parameters for upgrades to Big 8 auditors of –0.302 for "high debt" firms compared to –0.378 for "low debt" firms, which corresponds to discounts of 26 percent and 31 percent, respectively. We conclude that the results in table 2 are not affected by cross-sectional differences in long-term debt.

Losses in the Prior Three Years

The descriptive statistics in table 1 indicate that companies switching auditors have a higher incidence of losses in the past three years (53 percent) than nonswitching companies (23 percent). Firms with losses generally have lower audit fees so the variable LOSS may in some way be confounded with the initial engagement discount. To ensure that firms with losses are not driving the empirical results, the sample was partitioned into those firms with losses ($n = 407$) and those firms without losses ($n = 1{,}061$) to re-estimate the models in table 2. For both subsamples, the results are comparable to those reported in table 2. In model 1, the coefficient on the initial audit variable is negative and significant, while, in model 2, only upgrades from non-Big 8 to Big 8 auditors have negative and significant coefficients.

Nonaudit Fees

Prior studies have documented a positive relationship between audit fees and nonaudit fees for other services provided by auditors to clients (Craswell et al. 1995, 316–317). To ensure that the results in table 2 are not due to an omitted variable for nonaudit fees, models 1 and 2 were re-estimated with an additional control variable for the natural log of nonaudit fees. The parameter estimate for nonaudit fees is positive and significant at $p<0.01$, but this has no significant effect on the presence and magnitude of the initial engagement discounts reported in table 2.

Eliminating Second-Tier Auditors

The research design in our study combines all non-Big 8 auditors into one category and treats them as homogeneous. However, larger second-tier firms with national operations and smaller third-tier firms that are more regionally based are likely to have quite different practices and clienteles. As a sensitivity analysis to the definition of non-Big 8 auditors, the models in table 2 were re-estimated dropping all observations audited by second-tier accounting firms in Australia.[17] This eliminates 281 observations and results in the comparison of 853 companies audited by the Big 8 and 334 companies having regional non-Big 8 auditors, with 192 initial audit engagements in the reduced sample. Results of this re-estimation of models 1 and 2 are reported in table 3.

The results in table 3 are consistent with those in table 2 and show that the findings are robust to the specification of non-Big 8 auditors. In model 1, the initial audit variable

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[17] In 1987 there were eight second-tier Australian firms having national practices: Bentleys, Duesburys, Hendry Rae Court, Horwath & Horwath, KMG Hungerfords, Nelson Wheeler, Pannell Kerr Forster and Priestley & Morris.

TABLE 3
Audit Fee Regression Models Using Big 8 and Smaller Non-Big 8 Auditors
(Dependent Variable is Natural Log of Audit Fee)

	Model 1			*Model 2*		
Variable[a]	*Estimate*	*t-stat.*	*Prob.*[b]	*Estimate*	*t-stat.*	*Prob.*[b]
Control Variables:						
Intercept	−1.690	−9.88	0.0001	−1.742	−10.14	0.0001
LTA (+)	0.393	21.71	0.0001	0.393	21.76	0.0001
SUBS (+)	0.249	15.91	0.0001	0.247	15.80	0.0001
FOR (+)	−0.023	−0.90	0.8159	−0.019	−0.74	0.7700
CATA (+)	0.669	7.41	0.0001	0.675	7.50	0.0001
QUICK (−)	−0.012	−8.16	0.0001	−0.012	−8.26	0.0001
DE (+)	0.491	3.32	0.0004	0.494	3.36	0.0004
ROI (−)	−0.314	−2.99	0.0014	−0.316	−3.02	0.0013
OPIN (+)	0.167	3.53	0.0002	0.182	3.85	0.0001
YE (−)	0.048	0.82	0.7937	0.045	0.77	0.7792
LOSS (−)	−0.144	−2.92	0.0018	−0.139	−2.81	0.0025
BIG 8 (+)	0.234	4.92	0.0001	0.299	5.67	0.0001
Initial Engagement (Auditor Switch) Indicator Variables:						
Initial Audit (?)	−0.156	−2.62	0.0089			
Upgrades to Big 8 Auditors (?)				−0.357	−4.08	0.0001
Downgrades to Non-Big 8 Auditors (?)				−0.029	−0.15	0.8796
Within Non-Big 8 Auditor Changes (?)				0.081	0.76	0.4452
Within Big 8 Auditor Changes (?)				−0.121	−1.04	0.3006
Sample size		1187			1187	
F-statistic		326.84			263.99	
Adjusted R^2		0.77			0.77	

[a] Variables are defined in table 1, and expected signs are noted in parentheses.

[b] All p-values for the control variables are one-tailed probabilities, while those for the initial engagement (auditor switch) indicator variables are two-tailed probabilities.

is negative and significant at $p<0.01$. The parameter estimate is –0.156, which implies a discount of 16 percent. In model 2 the only significant auditor change indicator variable is for upgrades to Big 8 auditors. The parameter is –0.357 which is significant at $p<0.01$ and represents an average discount of 30 percent, the same as in table 2 for the full sample.

Analysis of the Year Before and Year After Auditor Changes

Companies changing auditors could have systematically different fees (relative to continuing engagements) and, consequently, the discount reported in table 2 could be due to model misspecification with respect to the sample of companies changing auditors rather than an initial engagement discount. In order to rule this out, additional data were collected to re-estimate model 2 for the year prior to and the year subsequent to the year of auditor changes. The prior and subsequent year data are from 1986 and 1988, respectively, except for the 95 auditor changes from 1985 and 1986, which use the appropriate prior/subsequent year data. Data availability results in a sample of 1,085 observations in the prior year and 1,544 observations in the subsequent year.

Results of these two estimations are reported in table 4 and show that *none* of the four auditor switch indicator variables is significant in either the year before or year after the auditor switch. Of particular interest is the insignificant result for upgrades to Big 8 auditors, which rules out that initial engagement discounts are caused by systematic model misspecification with respect to the companies in the study that changed auditors.

The "year after" regression indicates that fees of upgrades to Big 8 auditors return to the normal level of continuing engagements after the initial engagement year.[18] This contrasts with Simon and Francis (1988) who report that discounts continue for three years in the United States. The difference could be explained by the presence of quasi-rents in the United States that drive audit pricing and which results in larger amounts of across-the-board discounting for all initial engagements.

VI. CONCLUSIONS

The purpose of this study has been to test the competing theories of DeAngelo (1981a) and Dye (1991) and to determine whether initial engagement audit fee discounts do or do not occur in settings where audit fees are publicly disclosed. Audit fees are publicly disclosed in Australia and we find no evidence of fee discounting except when the initial engagement is an upgrade in audit quality from a non-Big 8 to Big 8 auditor. The observed initial audit fee discount for upgrades to Big 8 auditors is consistent with the well-established economic theory of discount pricing of higher-priced higher-quality *experience* goods (like Big 8 audits) as an inducement to purchase when there is information asymmetry between buyer and seller regarding product quality that is resolved only through purchasing the good.

Audit fee discounting has important public policy implications with respect to auditor independence. Indeed, the motivation for DeAngelo's (1981a) analysis is the widely held view that initial engagement discounting can impair auditor independence.[19] While DeAngelo (1981a) concludes that initial fee discounts do not necessarily affect auditor independence, Dye (1991) questions this conclusion. The evidence here is consistent with

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[18] Deis and Giroux (1996) report the same result and also find that total hours worked on initial engagements are actually higher than the hours for a control sample of continuing engagements which is consistent with the presence of initial audit start-up costs.

[19] For example, Simon and Francis (1988, 266–267) draw on prospect theory and the escalation of commitment literature to explain how an auditor's desire to not lose a new client, obtained through considerable effort including fee discounting, could lead to potential independence problems until audit fees return to normal levels.

TABLE 4
Regression Models Using Data in the Year Prior to and Year Subsequent to Initial Audit Engagements
(Dependent Variable is Natural Log of Audit Fees)

	Prior Year Data			*Subsequent Year Data*		
Variable[a]	*Estimate*	*t-stat.*	*Prob.*[b]	*Estimate*	*t-stat.*	*Prob.*[b]
Control Variables:						
Intercept	−1.104	−6.844	0.0001	−1.113	−6.902	0.0001
LTA (+)	0.348	22.494	0.0001	0.347	22.462	0.0001
SUBS (+)	0.234	18.061	0.0001	0.233	17.999	0.0001
FOR (+)	0.022	1.040	0.1492	0.023	1.106	0.1344
CATA (+)	0.389	5.295	0.0001	0.393	5.340	0.0001
QUICK (−)	−0.003	−5.799	0.0001	−0.004	−5.804	0.0001
DE (+)	0.159	1.589	0.0561	0.163	1.633	0.0514
ROI (−)	−0.043	−1.828	0.0338	−0.043	−1.832	0.0336
OPIN (+)	0.165	3.897	0.0001	0.168	3.959	0.0001
YE (−)	0.059	1.139	0.8726	0.057	1.113	0.8670
LOSS (−)	−0.149	−3.418	0.0003	−0.148	−3.405	0.0004
BIG 8 (+)	0.312	8.197	0.0001	0.334	8.233	0.0001
Initial Engagement (Auditor Switch) Indicator Variables:						
Up to Big 8 (?)	0.098	0.798	0.4253	−0.077	−0.855	0.3929
Down to Non-Big 8 (?)	0.005	0.054	0.9567	0.175	1.187	0.2353
Within Non-Big 8 (?)	−0.050	−0.534	0.5934	−0.045	−0.486	0.6270
Within Big 8 (?)	−0.178	−1.523	0.1280	−0.176	−1.524	0.1276
Sample size		1085			1544	
F-statistic		290.57			322.58	
Adjusted R^2		0.80			0.76	

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[a] Variables are defined in table 1, and expected signs are noted in parentheses.

[b] All p-values for the control variables are one-tailed probabilities, while those for the initial engagement (auditor switch) indicator variables are two-tailed probabilities.

Dye's (1991) argument that the public disclosure of audit fees eliminates quasi-rents and initial engagement discounts arising from quasi-rents. By implication, the potential auditor independence problems associated with quasi-rents and discounting are also eliminated by public disclosure of audit fees. Our findings, when viewed from the theoretical perspective of Dye (1991), suggest that the public disclosure of audit fees strengthens auditor independence.

With respect to initial engagement discounts for upgrades to Big 8 auditors, these discounts are argued to be a *buyer-induced* phenomenon caused by uncertainty about Big 8 quality. This phenomenon should not raise concerns about auditor independence if the discount is a short-term response by suppliers to sell differential audit quality given the presence of product uncertainty. The evidence here is that the amount of the initial discount (30 percent) is approximately equal to the normal Big 8 premium and that audit fees increase to the normal level of Big 8 engagements by the second year. Thus, the evidence from Australia, where audit fees are publicly disclosed, is that audit fee discounts do not generally occur and those discounts that do occur do not generally give rise to the kind of fee-related independence problems that have been speculated to exist in the United States.

REFERENCES

Accounting Today. 1997. Novak client perception study. (August 11–24): 5.

Baber, W., E. Brooks, and W. Ricks. 1987. An empirical investigation of the market for audit services in the public sector. *Journal of Accounting Research* 25: 293–305.

Barefield, R., J. Gaver, and T. O'Keefe. 1993. Additional evidence on the economics of attestation: Extending results from the audit market to the market for compilations and reviews. *Auditing: A Journal of Practice & Theory* 12: 74–87.

Beatty, R. 1989. Auditor reputation and the pricing of initial public offerings. *The Accounting Review* 63: 605–622.

Behn, B., J. Carcello, D. Hermanson, and R. Hermanson. 1997. The determinants of audit client satisfaction among clients of Big 6 firms. *Accounting Horizons* 11: 7–24.

Belsey, D., E. Kuh, and R. Welsch. 1980. *Regression Diagnostics*. New York, NY: John Wiley & Sons.

Butterworth, S., and K. Houghton. 1995. Auditor switching: The pricing of audit services. *Journal of Business Finance and Accounting* 22: 323–344.

Carcello, J., R. Hermanson, and N. McGrath. 1992. Audit quality attributes: The perceptions of audit partners, preparers, and financial statement users. *Auditing: A Journal of Practice & Theory* 11: 1–15.

Chan, P., M. Ezzamel, and D. Gwilliam. 1993. Determinants of audit fees for quoted UK companies. *Journal of Business Finance and Accounting* 20: 765–786.

Chung, D., and W. D. Lindsay. 1988. The pricing of audit services: The Canadian perspective. *Contemporary Accounting Research* 5: 19–46.

Craswell, A. 1988. *Who Audits Australia?* Sydney, Australia: Accounting and Finance Foundation, University of Sydney.

———, J. Francis, and S. Taylor. 1995. Auditor brand name reputations and industry specializations. *Journal of Accounting and Economics* 20: 297–322.

DeAngelo, L. 1981a. Auditor independence, "low balling," and disclosure regulation. *Journal of Accounting and Economics* 3: 113–127.

———. 1981b. Auditor size and audit quality. *Journal of Accounting and Economics* 3: 183–199.

Deis, D., and G. Giroux. 1996. The effect of auditor changes on audit fees, audit hours, and audit quality. *Journal of Accounting and Public Policy* 15: 55–76.

Dopuch, N., and R. King. 1996. The effects of lowballing on audit quality: An experimental markets study. *Journal of Accounting Auditing and Finance* 14: 45–68.

Dye, R. 1991. Informationally motivated auditor replacement. *Journal of Accounting and Economics* 14: 347–374.

Ettredge, M., and R. Greenberg. 1990. Determinants of fee cutting on initial audit engagements. *Journal of Accounting Research* 28: 198–210.

Francis, J. 1984. The effect of audit firm size on audit prices: A study of the Australian market. *Journal of Accounting and Economics* 6: 133–151.

———, and D. Simon. 1987. A test of audit pricing in the small-client segment of the U.S. audit market. *The Accounting Review* 62: 145–157.

———, and E. Wilson. 1988. Auditor changes: A joint test of theories relating to agency costs and auditor differentiation. *The Accounting Review* 63: 663–682.

———, and J. Krishnan. 1999. Accounting accruals and auditor reporting conservatism. *Contemporary Accounting Research* 16: (forthcoming).

Gregory, A., and P. Collier. 1996. Audit fees and auditor change: An investigation of the persistence of fee reduction by type of change. *Journal of Business Finance and Accounting* 23: 13–28.

Nelson, P. 1970. Information and consumer behavior. *Journal of Political Economy* 78: 311–329.

Novak, G. 1998. Do clients care about the Big 6 mega-mergers? *Accounting Today* (March 16–April 5): 7, 41.

O'Keefe, T., D. Simunic, and M. Stein. 1994. The production of audit services: Evidence from a major public accounting firm. *Journal of Accounting Research* 32: 241–261.

Palmrose, Z. 1986. Audit fees and auditor size: Further evidence. *Journal of Accounting Research* 24: 97–110.

———. 1988. An analysis of auditor litigation and audit service quality. *The Accounting Review* 63: 55–73.

Pearson, T., and G. Trompeter. 1994. Competition in the market for audit services: The effects of supplier concentration on audit fees. *Contemporary Accounting Research* 11: 115–135.

Rubin, M. 1988. Municipal audit fee determinants. *The Accounting Review* 63: 219–236.

Schatzberg, J. 1990. A laboratory market investigation of low balling in audit pricing. *The Accounting Review* 65: 337–362.

———, and G. Sevcik. 1994. A multiperiod model and experimental evidence of independence and "lowballing." *Contemporary Accounting Research* 11: 137–174.

Shapiro, C. 1983. Optimal pricing of experience goods. *The Bell Journal of Economics* 14: 497–507.

Simon, D., and J. Francis. 1988. The effects of auditor change on audit fees: Tests of price cutting and price recovery. *The Accounting Review* 63: 255–269.

Simunic D. 1980. The pricing of audit services: Theory and evidence. *Journal of Accounting Research* 18: 161–190.

———, and M. Stein. 1987. *Product Differentiation in Auditing: Auditor Choice in the Market for Unseasoned New Issues.* Vancouver, B.C.: Canadian Certified General Accountants Research Foundation.

Stigler, G. 1961. The economics of information. *Journal of Political Economy* 69: 213–225.

Teoh, S., and T. Wong. 1993. Perceived auditor quality and the earnings response coefficient. *The Accounting Review* 68: 346–366.

Tirole, J. 1988. *The Theory of Industrial Organization.* Cambridge, MA: MIT Press.

Turpen, R. 1990. Differential pricing on auditors' initial engagements: Further evidence. *Auditing: A Journal of Practice & Theory* 9, 60–76.

Watts, R., and J. Zimmerman. 1983. Agency problems, auditing, and the theory of the firm: Some evidence. *Journal of Law and Economics* 26: 613–634.

Weimer, D., and A. Vining. 1992. *Policy Analysis: Concepts and Practice.* 2nd edition. Englewood Cliffs, NJ: Prentice Hall.

Wilde, L. 1981. Information costs, duration of search, and turnover: Theory and applications. *Journal of Political Economy* 89: 1122–1141.

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The Effect of Experience on the Use of Irrelevant Evidence in Auditor Judgment

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ABSTRACT: Auditors encounter both relevant and irrelevant information during the performance of audit tasks. Prior studies have shown that the presence of irrelevant information weakens the impact of relevant information on auditors' judgments. Such studies, however, have not considered whether experience moderates the diluting effect of irrelevant information on auditors' judgments. This study reports the results of an experiment in which the effect of irrelevant information on the going-concern judgments of less-experienced auditors—audit seniors—is compared to the effect of irrelevant information on the going-concern judgments of more-experienced auditors—audit managers and partners. The experiment reaffirms that irrelevant information does have a diluting effect on the judgments of audit seniors but provides new evidence that irrelevant information does not have a diluting effect on the judgments of audit managers and partners.

Key Words: *Experience, Dilution effect, Irrelevant, Relevant.*

Data Availability: *Data and experimental materials will be made available by the author upon request.*

I. INTRODUCTION

Not all evidence is relevant to every decision an auditor makes during an audit of a client's financial statements. Studies of the judgments of audit seniors have shown that the presence of irrelevant information weakens the implication of relevant information. This phenomenon is referred to as the dilution effect (Nisbett et al. 1981).

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However, prior studies do not consider the role of experience on the use of irrelevant evidence in auditor judgment. The present study extends prior research by examining whether experience moderates the influence of irrelevant information on auditor judgment.

In the present study experienced auditors—partners and managers—and less-experienced auditors—audit seniors—were asked to make an assessment of an entity's ability to continue as a going concern. The subjects from both experience groups were randomly assigned to two different information conditions. The subjects in one condition were only provided information considered relevant to a going-concern judgment while subjects in the other condition were provided both relevant and irrelevant information.

The results indicate that significant dilution effects exist for audit seniors but do not exist for audit managers and partners. This means that the dilution effects observed in prior studies of audit seniors do not generalize to audit managers and partners. The results of the experiment have at least two important implications. First, they suggest that one important role of working paper review by managers and partners is to preclude the audit from being compromised by the diluting effect of irrelevant information on the judgments of less-experienced auditors. Second, the results suggest that one important goal for training programs and decision aids is to help less-experienced auditors ignore irrelevant information and focus on relevant information.

The remainder of this paper is organized as follows. Section II presents the relevant literature, underlying theory and hypothesis. Section III describes the research design and method. The results are presented in section IV. Section V discusses the results and offers conclusions.

II. RELEVANT LITERATURE, THEORY AND HYPOTHESIS

The Effect of Irrelevant Evidence and Experience

The dilution effect is often explained as the result of the representativeness heuristic, whereby people make a judgment by comparing a current target circumstance to a hypothetical circumstance (Kahneman and Tversky 1972; Alba and Hutchinson 1987). The presence of irrelevant information about the target reduces the similarity between the target and the hypothetical circumstance suggested by the relevant information. The literature in psychology indicates that the dilution effect may diminish with experience, possibly because more-experienced decision makers have highly developed knowledge structures (organization of knowledge in memory) that enable them to focus on relevant evidence (Patel and Groen 1986; Lesgold et al. 1988). Prior auditing studies have documented differences in knowledge structures of staff auditors, seniors and managers (Frederick et al. 1994; Libby and Frederick 1990; Tubbs 1992). Thus, the literature in psychology and auditing suggests that dilution effects in auditing may diminish because the more highly developed knowledge structures of experienced auditors will cause them to ignore irrelevant information.

Prior research on the dilution effect in auditing (Hackenbrack 1992; Hoffman and Patton 1997; Glover 1997) has focused on judgments of audit seniors with approximately three years of audit experience. Several studies indicate that auditors at this experience level have developed an organization of knowledge in memory sufficient to influence audit judgment in a specific audit task (Frederick 1991; Nelson et al. 1995; Bonner et al. 1996). While audit seniors have developed sufficient knowledge structure to influence audit judgment, they were still distracted by the presence of irrelevant information in prior studies of dilution. However, Glover (1997) finds that time pressure reduces the dilution effect in the judgments of audit seniors. Glover (1997) suggests that time pressure is one mechanism for forcing relatively inexperienced decision makers to focus on relevant information and to ignore irrelevant information. Findings in psychology indicate that highly developed knowledge structures are acquired through experience. Such knowledge structures could enable experienced decision makers to focus on relevant information without the presence of time pressure. This implies that the dilution effects observed in prior studies may have been weaker had judgments been made by more-experienced subjects.

Lesgold et al. (1988) find that experts are able to tune their perceptions of critical areas to specific cases and discount irrelevant information which novices use in their decisions. Similarly, studies in auditing find that expert auditors use directed strategies to acquire only relevant information, whereas novice auditors examine information sequentially which exposes them to irrelevant information (Biggs et al. 1987; Biggs and Mock 1983; Bouwman 1984). It is not necessarily the knowledge of what is relevant or irrelevant that distinguishes the expert's judgment from the novice. The expert tends to ignore irrelevant information while the novice seems unable to do so even when the irrelevancy of the information is recognized prior to making the decision (Shanteau 1993; Lesgold et al. 1988).

The literature cited above suggests that experienced decision makers have highly developed knowledge structures and use directed strategies to focus on only relevant information. In contrast, relative newcomers process information piece by piece, and their judgments are influenced by irrelevant information even in the presence of a discernible knowledge structure. Based on the studies cited above, I hypothesize that the judgments of experienced auditors will not be impacted by the presence of irrelevant information while the judgments of less-experienced auditors will be diluted by the presence of irrelevant information.

III. METHOD AND DESIGN

Background

The experiment focused on going-concern judgments. One reason for choosing a going-concern task is that audit seniors as well as audit managers and partners confront going-concern issues in practice. More importantly, prior research (Ricchiute 1992) indicates that experienced auditors have well-developed knowledge structures for going-concern tasks, and it is my conjecture that such knowledge structures are the reason that experienced auditors will be uninfluenced by irrelevant information.

Experienced and less-experienced subjects were randomly assigned to conditions in a between-subjects design. The type of evidence (relevant vs. a combination of relevant and irrelevant) and experience level (partners/managers vs. seniors) are the independent variables.[1] The dependent variable is the subject's assessment of the likelihood that the firm will fail within a year.

Pretest Procedures

The information used in the experimental materials in this study was pretested by five members (three partners and two managers) of the audit staff of a Big 6 accounting firm to identify information considered irrelevant for the going-concern task. Thirty-four items of information for going-concern assessments were screened.

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[1] The experiment also contained a manipulation to examine the effect of accountability on the judgment of experienced and less-experienced auditors when presented with irrelevant evidence. Consistent with Hoffman and Patton (1997), auditors in the accountable condition made judgments that were more conservative (i.e., higher assessment of failure) than did auditors in the not-accountable condition (mean of 38.72 vs. 28.82, p = .014). However, accountability did not affect the magnitude of the dilution effect nor interact with experience. Because of this, I collapse across the two accountability conditions. Information on confidence ratings was also gathered during the experiment. An analysis of the confidence ratings indicates no difference in the ratings of subjects in the accountable or not-accountable conditions, and no difference in the ratings of experienced and less-experienced subjects.

In the pretest, partners and managers initially read a one-page narrative describing the history and background of a hypothetical client. They were then asked to rate items as relevant (the information taken by itself influences his/her assessment of the company's ability to continue operations) or irrelevant (the information taken by itself is of no value in deciding if a company will continue operations within a year of the financial statement date). The subjects assigned values in the interval (−5, 5), with negative (positive) values indicating that the item made survival less (more) likely. A zero value for an item indicated that it had no impact on the firm's survival during the next year. Items rated from −5 to −1 (negative impact) and from 1 to 5 (positive impact) were considered relevant for the going-concern decision. Items rated as having no impact (influence) on judgment were considered irrelevant for the going-concern decision. Six (five) items were rated by all five of the participants as relevant (irrelevant). These 11 items are displayed in table 1 and are the items used in the experimental materials (table 1).

Prior to the administration of experimental materials, the five irrelevant and the six relevant items selected during the pretest of audit managers and partners were presented to four audit seniors. The four seniors were asked to rate the items as relevant or irrelevant

TABLE 1
Relevant and Irrelevant Evidence in the Experimental Materials

Relevant Evidence[a]	*Pretest Rating*[b]
The company incurred a net loss in the current and the immediately preceding year.	−2.8
During the current year the company experienced negative cash flows from operating activities.	−2.0
The company's debt-to-equity ratio is higher than the industry average.	−1.8
Strong competition has led to increasing marketing costs and lower margins.	−1.2
Production costs have led to the loss of a principal customer.	−2.2
The company was successful in restructuring its loan commitment at a lower borrowing rate.	2.2
Irrelevant Evidence	
The company's chief internal auditor retired and was replaced by a better-trained individual.	0
All supporting schedules requested by the auditing team were prepared and submitted by the client in a timely manner.	0
The management compensation package was revised to reflect the company's increased emphasis on achieving budgeted targets.	0
The company has begun a management rotation program.	0
The client makes periodic counts of physical inventory to correct errors in the individual perpetual inventory records.	0

[a] Relevant items received a nonzero rating by all audit seniors and partners/managers.

[b] Means from combined pretest ratings of both pretest groups (seniors and partners/managers) are presented. Participants were asked to rate items on a scale of −5 (negative impact) to +5 (positive impact) on the assessment of the ability of a company to continue. Items having no impact (rating of zero) were considered irrelevant for the going-concern decision.

to the assessment of the company's ability to continue operations. These four seniors rated the same items as relevant and irrelevant as the partners/managers in the pretest.[2]

Subjects

Two subject groups were used. The experienced subject group consisted of 56 partners and managers from four of the Big 6 accounting firms. The inexperienced group consisted of 31 audit seniors from four of the Big 6 accounting firms. The audit senior vs. audit partner/manager subject groups reflect differences in years of audit experience. The partners and managers had an average of 13.8 years of experience. The seniors had an average of 3.3 years of experience. Audit partners and managers evaluate the going-concern decision as part of every audit. Audit seniors have less audit experience but they are familiar with the going-concern task and they provide information to partners and managers for the going-concern decision. The experiment was administered to the subjects in either a small group setting or on an individual basis (depending on availability of subjects) at firm locations.[3]

Task

Each participant received a booklet containing a consent form, instructions and the experimental materials. Subjects were informed of the importance of working independently. The instructions indicated that the study was concerned with individual auditor judgment. Subjects were asked to assume they were the partner/manager for the current year's audit engagement and to consider the going-concern question.[4]

Subjects were provided background information about a hypothetical client. This background information included the history of the company, a description of the product line and the years of company operations. The partners and managers in the pretest indicated that the background information was not enough to afford any assessment of the company's current ability to continue operations. After receiving the background information, the subjects received audited financial statements of the last three years and the current year followed by a summary of the financial statements and other client-specific information.

Subjects in the control condition received only relevant client-specific information. Subjects in the dilution condition received the relevant control information plus client-specific information identified as irrelevant by participants in the pretest. After reading the case, subjects were asked to assess the likelihood that the client will continue operations within a year of the financial statement date.

After completing the case in part 1, auditors were presented with a separate folder (part 2) and asked not to refer to previous materials, questions, or answers in completing the questions in this folder. In part 2, auditors were asked to rate items as relevant or irrelevant to the assessment of the company's ability to continue operations. The participants were presented with the items identified by subjects in the pretest as relevant or irrelevant.

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[2] Additional pretest measures were taken to ensure that individual items rated as irrelevant by partners/managers and seniors would still be perceived as irrelevant when presented together. One-hour meetings were scheduled with participants in the pretest to discuss the items in the study and the reasons for the participants' selections of the items as relevant or irrelevant. The participants were asked to assess whether a company described by the combined irrelevant information was likely to continue operations within a year of the financial statement date. The individual items rated as irrelevant by the partners/managers and seniors were still perceived as irrelevant when presented together.

[3] Administration effects were not detected for subjects participating in the experiment in a small group setting vs. on an individual basis ($t = .28$, $p = .730$).

[4] The partners/managers in the study were told to assume they were the audit partner on the engagement. The seniors in the study were told to assume they were the manager on the engagement. The cases do not differ in other respects. Audit seniors, audit managers and audit partners confront going-concern issues in practice. Partners in the pretest indicated that partners and managers are viewed by the audit firm as having well-developed knowledge structures for the going-concern task.

IV. ANALYSIS AND RESULTS

Subjects' responses were analyzed in a 2 × 2 ANOVA with evidence type (relevant or a combination of relevant and irrelevant) and level of experience as between-subjects variables and the assessment of the likelihood of failure as the dependent variable. The auditors were asked to make judgments on the ability of a company to continue in existence through the end of the fiscal year on a zero to 100-point scale (ranging from "certain not to continue" to "certain to continue").

Panel A of table 2 presents descriptive statistics for the likelihood judgments of experienced and less-experienced auditors. Panel A shows that when more-experienced auditors were presented with both relevant and irrelevant information their mean likelihood judgments were not significantly different than when they were presented with relevant information only (means 32.41 and 35.76). In contrast, Panel A shows that the less-experienced auditors who were presented with both relevant and irrelevant information had

TABLE 2
Failure Judgments (%)[a] by Condition and Statistical Analysis of the Planned Comparisons

Panel A: Mean Failure Judgments by Condition (standard deviations in parentheses)

	Level of Experience[b]		
Type of Evidence[c]	*Experienced*	*Less Experienced*	*Overall*
Relevant	1 32.41 (16.95) n = 27	2 43.94 (19.20) n = 16	38.17 (18.07) n = 43
Relevant and Irrelevant	3 35.76 (21.66) n = 29	4 21.20 (12.91) n = 15	28.48 (17.28) n = 44
Overall	34.08 (19.30) n = 56	32.57 (16.05) n = 31	

Panel B: Planned Comparisons

	t-statistic	*p-value*
Relevant vs. relevant *and* irrelevant evidence by inexperienced auditors: (cell 2 vs. cell 4, Panel A)	3.48	.001
Relevant vs. relevant *and* irrelevant evidence by experienced auditors: (cell 1 vs. cell 3, Panel A)	.68	.494

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[a] Assessment of the likelihood that the firm will fail.

[b] Partners/managers were the experienced auditors. Audit seniors were the less-experienced auditors.

[c] Subjects were asked to make likelihood-of-firm-failure judgments based on relevant information alone or a combination of relevant and irrelevant information.

lower mean likelihood judgments that the company would fail (mean = 21.20) than the less-experienced subjects who were presented with relevant information only (mean = 43.94).

As hypothesized, the ANOVA reveals a significant evidence by experience interaction (F = 9.88, p = .002). Panel B of table 2 reports the results of planned comparisons for purposes of testing the hypothesis.[5] The results of planned contrast are as predicted: (1) there is a significant effect of evidence type on the judgments of the less-experienced auditors (t = 3.48; p = .001), and (2) there is no significant effect of type of evidence on the judgments of the experienced auditors (t = .68; p = .494).[6] This result indicates that the less-experienced auditors' judgments were significantly influenced by irrelevant information and that the irrelevant evidence did not significantly influence the judgment of experienced auditors.[7]

In the debriefing, participants were presented with the items identified by subjects in the pretest as relevant or irrelevant. The participants consistently rated the same items as irrelevant as subjects in the pretest. Furthermore, the debriefing results indicate that experienced and less-experienced subjects did not differ in their ratings of relevant vs. irrelevant cues. Thus, differences between more and less-experienced auditors' going-concern judgments cannot be attributed to differences in knowledge of cue relevance.

V. SUMMARY

This study finds that experience reduces the influence of irrelevant information on auditor judgment. More experienced auditors (partners and managers) are not influenced by the presence of irrelevant information in making a going-concern judgment. However, consistent with prior research (Hackenbrack 1992; Hoffman and Patton 1997; Glover 1997), less-experienced auditors (seniors) are influenced by the presence of irrelevant information. The results in the present study cannot be explained by differences in less-experienced and experienced auditors' perceptions about the relevance and irrelevance of the presented information. The debriefing procedures indicate that experienced and less-experienced subjects do not differ in their ratings of relevant vs. irrelevant cues. The finding that the dilution effect diminishes with experience is consistent with previous psychology and auditing research demonstrating that knowledge structures developed through experience moderate the impact of irrelevant evidence on audit judgment (Patel and Groen 1986; Lesgold et al. 1988; Biggs et al. 1987).

Prior studies raised concerns about audit effectiveness because the studies provided evidence that the judgments of audit seniors were impacted by irrelevant information. The results of this study contribute to the alleviation of those concerns to the extent that the audit review process allows experienced auditors to detect and correct the dilution-impacted judgments of less-experienced auditors.

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[5] Planned comparisons were computed by using the mean square error (MSE) from the overall ANOVA, F (1,83).

[6] A *post hoc* examination of the experienced group's responses indicates that the dilution effect does not decrease linearly with experience. It appears that the dilution effect disappears around eight years of experience. This finding is consistent with a survey conducted by Abdolmohammadi (1989) that reports the years of experience required to choose an audit opinion (modified unqualified if going-concern issue) as 8.5 years.

[7] These findings were consistent across firms. The less-experienced auditors from each of the Big 6 firms participating in the study exhibited the dilution effect in their judgments. In contrast, the experienced auditors from each of the Big 6 firms did not exhibit a dilution effect in their judgment.

REFERENCES

Abdolmohammadi, M. J. 1989. A taxonomy of audit task complexity for decision aid development. Working paper, Bentley College, Waltham, MA.

Alba, J. W., and J. W. Hutchinson. 1987. Dimensions of consumer expertise. *Journal of Consumer Research* 13: 411–454.

Biggs, S. F., and T. J. Mock. 1983. An investigation of auditor decision processes in the evaluation of internal controls and audit scope decisions. *Journal of Accounting Research* 21: 234–255.

———, W. F. Messier, Jr., and J. V. Hansen. 1987. A descriptive analysis of computer audit specialists' decision-making behavior in advanced computer environments. *Auditing: A Journal of Practice & Theory* 6 (Spring): 1–21.

Bonner, S., R. Libby, and M. W. Nelson. 1996. Using decision aids to improve auditors' conditional probability judgments. *The Accounting Review* 71 (April): 221–240.

Bouwman, M. J. 1984. Expert vs. novice decision-making in accounting: A summary. *Accounting, Organizations and Society* 9: 325–327.

Frederick, D. M. 1991. Auditors' representation and retrieval of internal control knowledge. *The Accounting Review* 66 (April): 240–258.

———, V. B. Heiman-Hoffman, and R. Libby. 1994. The structure of auditors' knowledge of financial statement errors. *Auditing: A Journal of Practice & Theory* 13 (Spring): 1–21.

Glover, S. 1997. The influence of time pressure and accountability on auditors' processing of nondiagnostic information. *Journal of Accounting Research* 35 (Autumn): 213–226.

Hackenbrack, K. 1992. Implications of seemingly irrelevant evidence in audit judgment. *Journal of Accounting Research* 30 (Spring): 126–136.

Hoffman, V., and J. Patton. 1997. Accountability, the dilution effect, and conservatism in auditors' fraud judgments. *Journal of Accounting Research* 35 (Autumn): 227–237.

Kahneman, D., and A. Tversky. 1972. Subjective probability: A judgment of representativeness. *Cognitive Psychology* 3: 430–454.

Lesgold, A., H. Rubinson, P. Feltovich, R. Glaser, D. Klopfer, and Y. Wang. 1988. Expertise in a complex skill: Diagnosing x-ray pictures. In *The Nature of Expertise*, edited by M. T. H. Chi, R. Glaser, and M. J. Farr, 311–342. Hillsdale, NJ: Erlbaum.

Libby, R., and D. M. Frederick. 1990. Experience and the ability to explain audit findings. *Journal of Accounting Research* 28 (Autumn): 348–367.

Nelson, M. W., R. Libby, and S. E. Bonner. 1995. Knowledge structures and the estimation of conditional probabilities in audit planning. *The Accounting Review* 70 (January): 27–47.

Nisbett, R. E., H. Zukier, and R. E. Lemley. 1981. The dilution effect: Nondiagnostic information weakens the implications of diagnostic information. *Cognitive Psychology* 13: 248–277.

Patel, V. L., and G. L. Groen. 1986. Knowledge based solution strategies in medical reasoning. *Cognitive Science* 10: 91–116.

Ricchiute, D. N. 1992. Working-paper order effects and auditors' going-concern decisions. *The Accounting Review* 67: 46–58.

Shanteau, J. 1993. Discussion of expertise in auditing. *Auditing: A Journal of Practice & Theory* 12 (Supplement): 51–56.

Tubbs, R. M. 1992. The effect of experience on the auditor's organization and amount of knowledge. *The Accounting Review* 67 (October): 783–801.

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Investors' Recovery Friction and Auditor Liability Rules

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ABSTRACT: This paper examines investor welfare under two different liability regimes for holding auditors liable for investor losses, the due care and the strict liability regimes. In both regimes, the investor pays the expected legal liability cost to the auditor, and a portion of any subsequent damages awarded by the court is retained by the lawyer as a contingent fee, which is called the recovery friction. This study finds that the presence of the recovery friction leads to second-best efforts by the auditor and the manager. Investor welfare in the due care regime is higher than in the strict liability regime because the expected litigation cost for the investor is lower. Investor welfare is higher in the due care regime than in the strict liability regime *even* when audit effort in the due care regime is *lower* than audit effort in the strict liability regime.

Key Words: *Auditor liability, Negligence rules, Contingent fee, Audit quality.*

I. INTRODUCTION

This paper develops a model that examines the interactions between liability regimes, audit effort, auditor penalties and investor welfare. In the model, the firm requires capital from the investor, the firm type can either be good or bad, and the manager's effort determines the firm type. When the firm type is bad, investor losses occur with certainty. When the firm type is good, investor losses occur with a positive probability. Firm type is not directly observable, but the auditor provides a report on firm type. The investor provides capital to the firm only if the auditor reports the firm type as good. Investor losses arise either due to investment outcome risk, i.e., the loss from investment when the auditor reports the firm type as good and the true firm type is good, or due to reporting risk, i.e., the loss from investment when the auditor reports the firm type as good when

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[1] An adverse event occurs when a loss is realized. The loss for the investor is a real loss and hence the model is descriptive of suits under Section 11 of the Securities Exchange Act, 1934. Typically under Section 11 of the Securities Exchange Act, 1934, the investor's maximum recovery is limited to the contributed amount. More importantly, this paper does not capture the transfer of wealth from one set of investors to another, i.e., Section 10b(5) class action suits.

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the true firm type is bad. The auditor is sued when investor losses occur, but the outcome of the suit depends upon firm type and the liability regime.[1] The lawyer operates on a contingent-fee basis, i.e., part of the damages awarded by the courts is retained by the lawyer. The proportion of damages retained by the lawyer is called the *recovery friction.* Audit fees, which are paid by the investor, include the amount that the auditor expects to pay in damages. However, the investor recovers only a portion of the damages in the event of a loss. Hence, the investor's expected litigation cost includes components for the full damages and the recovery friction. The lawmaker maximizes the investor's expected payoff by choosing the liability regime and an appropriate audit penalty.

Two liability regimes are examined: the due care regime and the strict liability regime. In neither liability regime is the auditor held liable for the investor loss that arises due to investment outcome risk. In the due care regime, auditors are not liable for investor losses arising from an erroneous audit report unless audit effort falls short of that required in the circumstances. The level of effort needed to make the auditor immune from liability—the due care standard—is not known in advance. In the strict liability regime, the auditor is held liable for all losses arising from an erroneous audit report. Investor welfare is compared across the two liability regimes. Investor welfare is the same in both regimes if, and only if, the recovery friction is zero. In other words, when the recovery friction is zero, both liability regimes induce the same audit effort and manager effort.

In the model, the investor's welfare depends upon the expected cost of litigation. When recovery friction exists, the investor's expected litigation cost is affected by the alternative liability regimes in two ways. First, the probability of finding the auditor liable is lower in the due care regime than in the strict liability regime. The lower probability, in turn, decreases the investor's expected litigation cost in the due care regime. This decrease in the expected litigation cost is labeled *the probability effect*. Second, the optimal audit penalty could be higher in the due care regime than in the strict liability regime. This higher optimal audit penalty would lead to a higher investor's expected litigation cost in the due care regime. This increase in the expected litigation cost is labeled *the penalty effect*. The probability effect dominates the penalty effect, which means that the investor's expected litigation cost is lower in the due care regime than in the strict liability regime. The decrease in the expected litigation cost results in a higher investor welfare in the due care regime. To summarize, when recovery friction exists, the investor welfare is higher in the due care regime than in the strict liability regime.

Gode (1993) examines a model in which the audit fee includes the amount that the auditor expects to pay in damages to the investor and in which the investor recovers all the damages paid by the auditor when the auditor is held liable for investor losses. Gode (1993) shows that the auditor and the investor are indifferent between the due care and strict liability regimes. Schwartz (1997) examines the effect of the liability regimes on audit penalty, audit effort and investment level. She shows that the first-best audit effort and investment level is attained under both liability regimes when the audit penalty is appropriately chosen. In contrast to these studies, my analysis considers the effect of the recovery friction on investor welfare. The investor's expected litigation cost is determined by the audit penalty and the recovery friction. It is shown that the due care and strict liability regimes achieve the first-best audit effort if, and only if, there is no recovery friction. With recovery friction, investor welfare is higher in the due care regime than in the strict liability regime.

Narayanan (1994) examines the effect of the due care and strict liability regimes on audit effort when the damages are exogenously specified. He shows that, under the joint and several damages apportionment rule, audit effort is higher in the due care regime than in the strict liability regime, if the probability that the auditor is not held liable in the due care regime is sufficiently sensitive to changes in audit effort. Schwartz (1998) examines the effect of the strict liability, the vague due care and the clear due care liability regimes on audit effort when the damages are exogenously specified. In the vague due care regime, the due care standard is not known in advance, while in the clear due care regime the due care standard is known in advance. The vague due care regime is similar to the due care regime examined here. She finds that the audit effort in the vague due care regime is lower than in the clear due care regime. However, the audit effort in the strict liability regime could be either higher or lower than in the vague due care regime. Both Narayanan (1994) and Schwartz (1998) conclude that the investor welfare is highest in the liability regime with the highest audit effort. My analysis differs from these studies in two ways. First, my model incorporates both the audit penalty and audit effort as endogenous choice variables. Second, I consider the effect of recovery friction on investor welfare. I find that with recovery friction investor welfare is higher in the due care regime than in the strict liability regime, even if the audit effort is lower.[2]

Other studies have examined the effect of specific auditor liability regimes or damage apportionment rules on audit effort. Melumad and Thoman (1990) and Nelson et al. (1988) assume a strict liability regime to examine the audit market under adverse selection. Sarath (1991) and Balachandran and Nagarajan (1987) assume a clear due care liability regime, and examine the effect of insurance on audit effort. Narayanan (1994) examines the effect of the joint and several liability rule and the proportional liability rule on audit effort. He shows that the audit effort is higher with the proportional liability rule than with the joint and several liability rule. Chan and Pae (1998) examine the effect of the joint and several liability rule and the proportional liability rule on audit effort and investor welfare where the damages are exogenously specified. They show that audit effort can decrease while investor welfare increases when the joint and several liability rule is replaced with the proportional liability rule. In contrast, the focus of this study is on providing insights into the interactions between the strict and due care liability regimes, audit effort, audit penalty and investor welfare in the presence of recovery friction.

The rest of the paper is organized as follows: section II develops the model; section III contains the analysis of the model; and section IV provides some concluding remarks.

II. THE MODEL

Consider three risk-neutral players: the investor, the manager and the auditor. The firm type (y) could be either good (G) or bad (B), i.e., $y \in \{G,B\}$. The manager's unobservable effort $\beta \in [0.5,1]$ determines the probability of $y = G$. That is, the firm type is good with probability β and bad with probability $[1 - \beta]$. The manager incurs a cost of $f(\beta)$, with $f(\beta = 0.5) = 0$, $f'(\beta) > 0$ and $f''(\beta) > 0$; the cost of the manager's effort increases at an increasing rate. The firm type (y) is not directly observable by any player and thus cannot be used for contracting.

The audit effort ($\alpha \in [0,1]$) determines the probability that the auditor reports the firm type as bad, given that the true firm type is bad. That is, with probability α the auditor reports $r = B$, given that $y = B$. Also, given that $y = G$ the auditor correctly reports r

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[2] The result that the due care regime is superior to the strict liability regime is well established in the economics and law literature. In general, the due care regime reduces the marginal litigation costs for the auditor and, hence, provides an incentive for the auditor to increase audit effort (for instance, see Shavell 1980, 1987).

$= G$ with probability one. The auditor incurs a cost of $t(\alpha)$ with $t'(\alpha) > 0$ and $t''(\alpha) > 0$. The cost of audit effort increases at an increasing rate. The auditor is paid a noncontingent fee, ϕ.

The investor decides to invest K, based on the auditor's reports. The investment yields W with probability $(1 - v)$ and a loss z with probability $v \in (0,1)$ given that $y = G$. The investment results in a loss z with probability one given that $y = B$. W is assumed to be sufficiently high such that the investor finds it attractive to invest. The manager's compensation is ψ when the investment yields W and zero otherwise.[3]

The investor's optimum investment strategy is not to invest if the auditor reports $r = B$, because the posterior probability of $y = B$, given the auditor's report of $r = B$, and the probability that the investment results in a loss if $y = B$ are assumed to be one. Intuitively, the investor knows (with certainty) that the investment will yield the loss when $r = B$ is reported. Hence, the investor will not invest when the auditor reports $r = B$. The investor's optimum strategy is to invest when the auditor reports $r = G$ because W is sufficiently high.

Given the loss z, the manager and the auditor are sued. With probability c the court concludes that the firm type is bad, given that the true firm type is bad (i.e., $y = B$) and the auditor reports the firm type to be good (i.e., $r = G$).[4] With probability one, the court concludes that the firm type is good when the true firm type is good. When the court concludes that the firm type is bad, the manager is charged a penalty of γ.[5]

In the due care regime, the auditor is liable for damages only if the court concludes that the firm type was bad and the auditor was "negligent." When the court concludes that the firm type was bad, the probability that the auditor is held liable is given by $[1 - h(\alpha)]$. $h(\alpha)$ represents the probability that the auditor meets the due care standard and will not be held liable for any portion of the investor's loss. This probability is based on the rules of evidence and professional audit standards. It is assumed that $h'(\alpha) > 0$ and $h''(\alpha) < 0$ for $\alpha \in (0,1)$.[6] The probability that the auditor is held liable decreases at an increasing rate. In the strict liability regime, when the court concludes that the firm type is bad, the auditor is automatically held liable.[7] The conditional probability of the auditor being held liable in the due care and strict liability regimes given that $y = B$ is denoted as I^{DC} and I^{SL}, respectively.[8] When the auditor is held liable, he is charged a penalty of δ. The penalties on the auditor and the manager are determined endogenously.[9] Damages awarded by the courts,

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[3] This is a hidden-action, limited-liability setting for the manager in the sense of Sappington (1983). The assumption here is that the investor cannot penalize the manager through the compensation contract. The penalties on the manager can be imposed by the court only when the court concludes that the firm type was bad.

[4] The conditional probability c denotes the chance of conviction given the rules of evidence.

[5] The penalty on the manager is not necessary for the results. That is, γ can be set equal to zero.

[6] *Ex post* the due care standard can be specified as $\hat{\alpha}$ with $h = \text{Prob}(\alpha > \hat{\alpha})$. In the model, $\hat{\alpha}$ is suppressed and $h(\alpha)$ is considered a function of α because $\hat{\alpha}$ is not known *ex ante*. This characterization of negligence rules is similar in spirit to the vague due care concept of Schwartz (1997, 1998).

[7] In both liability regimes the auditor is held liable only if a bad firm type is reported as a good firm type. The investor bears the loss from investment when the firm type is good. Note that the investor faces an investment outcome risk (*ex ante* good investments can have bad outcomes) and a reporting risk (bad investments can be reported as good investments). The legal liability regimes protect the investor from the reporting risk alone, which is in accordance with the intent of Section 10b(5) and Section 11 of the Securities Exchange Act, 1934. This feature of the model is different from the models analyzed in earlier studies. For instance, Schwartz (1997, 1998) examines a strict liability regime in which there is no level of audit effort that relieves the auditor of the obligation to investors in the event of a loss.

[8] That is, $I^{DC} = [1 - h(\alpha)](1 - \alpha)c$ and $I^{SL} = (1 - \alpha)c$. For later notational convenience, I also define $\partial I^{\cdot}/\partial\alpha = I^{\cdot}_{\alpha}$.

[9] The penalty is not restricted to be a function (or proportion) of the loss incurred by the investor. In general, in addition to compensatory damages, punitive damages are also assessed (see also Polinsky and Che 1991; Schwartz 1998). Punitive damages are assessed when the auditor is also involved in the "wrong doing," which is not considered in this model. Hence, the endogenous penalty determined here is strictly compensatory damages, because it is based on (1) the real loss z, (2) the cost of the audit effort, and (3) the cost of litigation.

(*Continued on next page*)

i.e., $(\gamma + \delta)$, are shared by the investor and the lawyer. The lawyer retains a portion $q \in (0,1)$, and the investor gets the remainder $(1 - q)$. In other words, the lawyer charges a contingent fee, and q is the recovery friction.

In the model, the lawmaker chooses the legal liability regime and the penalties (γ, δ) to maximize the investor welfare. The investor chooses the compensation scheme and the audit fee (ψ, ϕ). The lawmaker and the investor are considered as one player who sets the tuple $\{\gamma, \delta, \psi, \phi\}$ and the liability regime to maximize the investor welfare. The choice of the manager's effort (β) and the audit effort (α) is not observable, and the auditor and the manager choose $\{\alpha, \beta\}$ as self-interest maximizers, given the liability regime and $\{\gamma, \delta, \psi, \phi\}$.[10] Uncertainty about firm type (y) is never fully resolved by any player; therefore, firm type cannot be used for contracting. All other parameters and functions are common knowledge. The sequence of events for the due care and strict liability regimes are depicted in event-trees in figures 1 and 2, respectively.

The auditor's expected utility is:

$$U^A(\cdot) = \phi - t(\alpha) - \delta I^k(1 - \beta), \tag{1}$$

where k = DC in the due care regime and k = SL in the strict liability regime. The auditor's expected utility is made up of the noncontingent fee less the cost of audit and the expected legal liability cost. The auditor's reservation utility is set to zero.

The manager's expected utility is:

$$U^M(\cdot) = \psi(1 - v)\beta - \gamma c(1 - \alpha)(1 - \beta) - f(\beta). \tag{2}$$

The manager's expected utility is made up of the expected compensation less the expected legal liability cost and the cost of effort. The manager's reservation utility is set to zero.

The investor's expected utility is:

$$\begin{aligned} U^I(\cdot) = {} & [(W - \psi)(1 - v) - zv - K]\beta - (K + z)(1 - \alpha)(1 - \beta) \\ & + (1 - q)(1 - \beta)[\gamma c(1 - \alpha) + \delta I^k] - \phi, \end{aligned} \tag{3}$$

where k = DC in the due care regime and k = SL in the strict liability regime. The investor's expected utility is made up of the expected residual return and the expected recovery from the manager and the auditor. The investor's expected utility is considered to be the investor welfare.

Footnote 9 (Continued)

Also, in the model analyzed here, the loss is a real loss due to misallocation of resources (as in an IPO). Lawsuits in such instances can be brought under Section 11 of the Securities Exchange Act, 1934, but Section 11 places a limit on the total recovery/damages that can be assessed. Specifically, the total recovery is limited to the amounts collected through the IPO. This introduces another layer of recovery friction that is not explicitly considered here. In practice, however, most lawsuits that can be brought under Section 11 are filed under Section 10b(5), where there are no specific limits placed on the recovery (see Alexander 1991).

[10] The court is an automaton that (1) applies the evidence rules that determine the probability c given that the firm type is bad and the auditor reports the firm type as good, (2) applies the negligence rules announced by the lawmaker for the auditor, and (3) imposes the penalties announced by the lawmaker.

The problem is described in the following program.

Program 1

$$\max_{\alpha,\beta,\gamma,\delta,\phi,\psi} \quad U^{I}(\cdot) \tag{4}$$

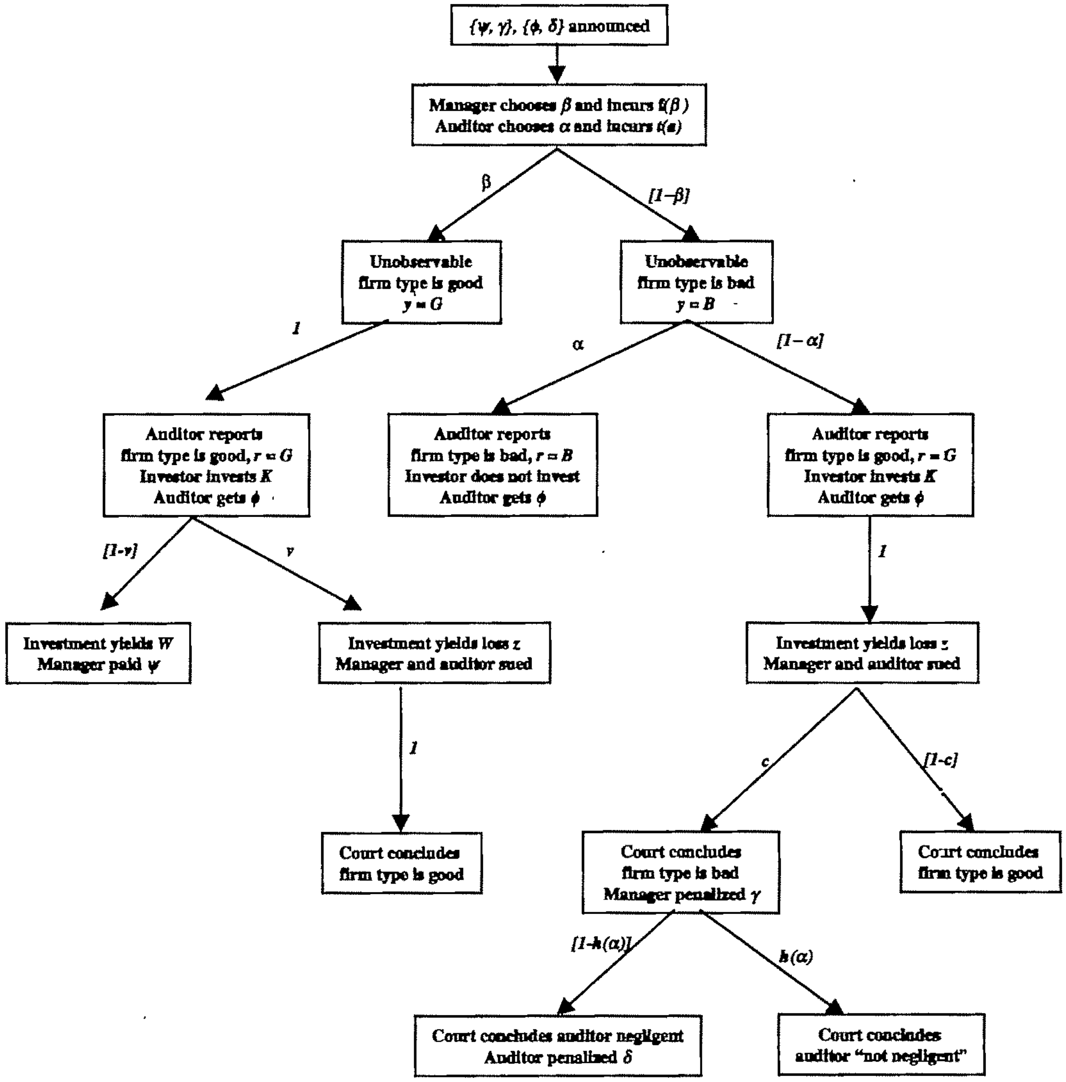
$$\text{s.t } U^{A}(\alpha,\beta,I,\gamma,\delta,\psi,\phi) \geq 0, \tag{5}$$

$$U^{M}(\alpha,\beta,I,\gamma,\delta,\psi,\phi) \geq 0, \tag{6}$$

$$\alpha \in \text{argmax}_{\hat{\alpha}} U^{A}(\hat{\alpha},\beta,|I,\gamma,\delta,\phi,\psi), \tag{7}$$

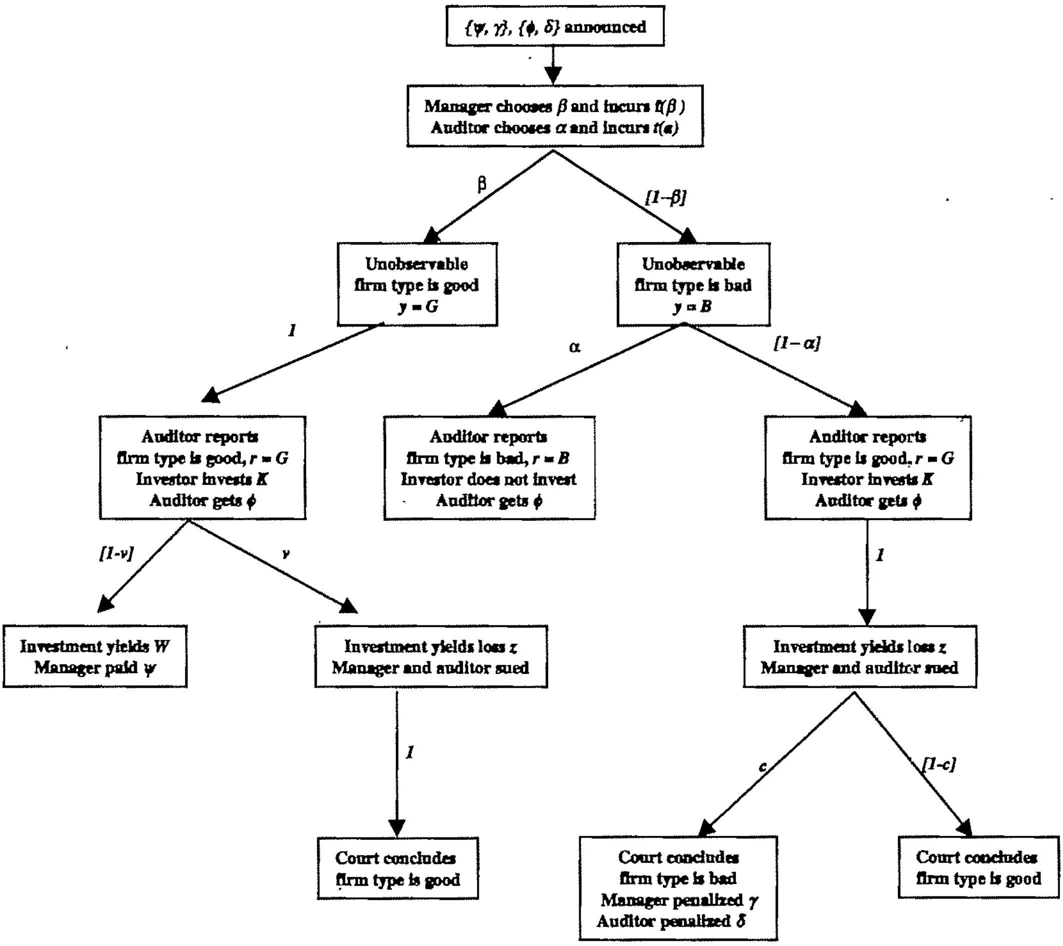
$$\beta \in \text{argmax}_{\hat{\beta}} U^{M}(\hat{\beta},\alpha,|I,\gamma,\delta,\phi,\psi). \tag{8}$$

FIGURE 1
Event-Tree for the Due Care Regime


{ψ, γ}, {φ, δ} announced
Manager chooses β and incurs f(β)
Auditor chooses α and incurs t(α)
β
[1-β]
Unobservable firm type is good y = G
Unobservable firm type is bad y = B
1
α
[1-α]
Auditor reports firm type is good, r = G Investor invests K Auditor gets φ
Auditor reports firm type is bad, r = B Investor does not invest Auditor gets φ
Auditor reports firm type is good, r = G Investor invests K Auditor gets φ
[1-v]
v
1
Investment yields W Manager paid ψ
Investment yields loss z Manager and auditor sued
Investment yields loss z Manager and auditor sued
1
c
[1-c]
Court concludes firm type is good
Court concludes firm type is bad Manager penalized γ
Court concludes firm type is good
[1-h(α)]
h(α)
Court concludes auditor negligent Auditor penalized δ
Court concludes auditor "not negligent"

All variables are defined in table 1.

FIGURE 2
Event-Tree for the Strict Liability Regime


$\{\psi, \gamma\}, \{\phi, \delta\}$ announced
Manager chooses β and incurs $t(\beta)$
Auditor chooses α and incurs $t(\alpha)$
β
$[1-\beta]$
Unobservable firm type is good $y = G$
Unobservable firm type is bad $y = B$
1
α
$[1-\alpha]$
Auditor reports firm type is good, $r = G$ Investor invests K Auditor gets ϕ
Auditor reports firm type is bad, $r = B$ Investor does not invest Auditor gets ϕ
Auditor reports firm type is good, $r = G$ Investor invests K Auditor gets ϕ
$[1-v]$
v
1
Investment yields W Manager paid ψ
Investment yields loss z Manager and auditor sued
Investment yields loss z Manager and auditor sued
1
c
$[1-c]$
Court concludes firm type is good
Court concludes firm type is bad Manager penalized γ Auditor penalized δ
Court concludes firm type is good

All variables are defined in table 1.

Equation (4) provides the objective function of maximizing the investor welfare. Equations (5) and (6) are the reservation utility constraints for the auditor and the manager, respectively. Equations (7) and (8) are the incentive constraints for the auditor's choice of α and the manager's choice of β, respectively.[11] Only cases in which an interior solution to program 1 obtains are considered. In order to facilitate the discussion of the model's results, table 1 contains a glossary of notation.

III. THE RESULTS

First, the equilibrium first-best solution is examined. The equilibrium first-best solution is obtained when all players can observe the auditor's effort and the manager's effort.

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[11] The incentive constraints provide the conditions for a simultaneous-move Nash equilibrium. In this setting, the sequence of the auditor choosing effort after the manager has chosen effort results in the simultaneous-move Nash equilibrium because y is not observable.

TABLE 1
Definition of Variables

Notation	*Description*
$y \in G, B$	Unobservable firm type
$r \in G, B$	Auditor's report on firm type
ϕ	Noncontingent audit fee
$\beta \in [0.5, 1]$	Manager's effort which is equal to the probability of $y = G$
$f(\beta)$	Cost of manager's effort
$\alpha \in [0, 1]$	Auditor's effort which is equal to the probability of $r = B$ given $y = B$
$t(\alpha)$	Cost of auditor's effort
K	Investment in project
W	Return from project investment
z	Loss from project investment
$v \in (0, 1)$	Probability of loss z given that $y = G$
ψ	Manager's compensation
γ	Manager penalty when the court concludes $y = B$
δ	Audit penalty when the court concludes $y = B$ and the auditor is held liable
c	Probability that the court concludes $y = B$ given $y = B$ and $r = G$
DC	The due care regime
SL	The strict liability regime
$h(\alpha) \in (0, 1)$	Probability that the auditor is not held liable in DC
q	Portion of damages retained by the lawyer; the recovery friction
U^I	Expected utility of the investor
U^A	Expected utility of the auditor
U^M	Expected utility of the manager
$I^{SL} = [1 - \alpha]c$	Probability that the auditor is held liable given a loss occurs in SL
$I^{DC} = [1 - h(\alpha)][1 - \alpha]c$	Probability that the auditor is held liable given a loss occurs in DC

Technically, the solution to program 1 that is obtained without considering the incentive constraints given by equations (7) and (8) provides the equilibrium first-best solution.[12]

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[12] The equilibrium first-best solution provides the benchmark investor welfare when moral hazard problems, with respect to the auditor's effort and the manager's effort, do not exist.

The First-Best Solution

Schwartz (1997), in a model without recovery friction, finds that the lawmaker/investor can impose an appropriate audit penalty to obtain the first-best solution to a problem otherwise similar to that in program 1. However, in her model, the audit penalty does not impose additional costs for the investor. In my model, the investor's expected litigation cost depends on the audit penalty because of the recovery friction. Thus, the question is whether an equilibrium first-best solution exists in this setting. The condition under which the equilibrium first-best solution obtains is provided in the following proposition.[13]

Proposition 1:

1.1 The first-best solution obtains in the due care and strict liability regimes if, and only if, there is no recovery friction, i.e., $q = 0$.

1.2 The strict liability and due care regimes provide the same level of (a) audit effort α, (b) manager's effort β, (c) expected payoff to the auditor U^A, (d) expected payoff to the manager U^M and (e) expected payoff to the investor U^I, if there is no recovery friction (i.e., $q = 0$).

Proposition 1.1 states that there is no equilibrium first-best solution unless the recovery friction is zero. The investor pays for the auditor's expected legal liability cost through the audit fee (equation 5). The investor expects to collect all the payments for the auditor's expected legal liability costs only if there is no recovery friction (i.e., $q = 0$). Thus, the investor's expected litigation cost is zero, if and only if, the recovery friction is zero. In other words, the investor obtains fair insurance from the auditor if, and only if, the recovery friction is zero which leads to the first-best solution. When recovery friction exists, the investor's expected litigation cost is positive and hence, the audit penalty is costly for the investor. In other words, it is costly for the investor to obtain insurance from the auditor. Consequently, the equilibrium first-best solution does not obtain when recovery friction exists. Proposition 1.2 elaborates on Proposition 1.1. Specifically, if both the due care and the strict liability regimes achieve the first-best solution, the audit effort, the manager's effort and the expected payoffs to the auditor, the manager and the investor are the same.

Liability Regimes and Investor Welfare

Narayanan (1994) shows that audit effort is higher in the due care regime than in the strict liability regime if the probability that the auditor is not held liable is sufficiently responsive to audit effort (i.e., $h'(\cdot)$ is large). Narayanan (1994) does not consider investor welfare directly and concludes that investor welfare will be higher with higher audit effort. In contrast, in my analysis, investor welfare is specifically examined and I do not assume that an increase in audit effort improves investor welfare. Also, the audit penalty is an endogenous choice variable which, along with the recovery friction, determines the investor's expected litigation cost. The comparison of the investor welfare across the liability regimes is provided in the following proposition.[14]

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[13] The proofs for all the propositions are in the appendix.

[14] One important distinction between the due care and strict liability regimes is the cost of implementing the rules of evidence. It is natural to expect the due care regime to be more costly to implement. Similarly, the lawyer's fees, which are determined by the recovery friction, are also likely to be different across the regimes. For example, in the due care regime the plaintiffs have to establish not only that the firm type was bad, but also that the auditor was negligent. Hence, the recovery friction (contingent fee for the lawyer, q) is likely to be higher in the due care regime. The analysis here, as in earlier work, focuses on the value-generation aspect and not the cost aspect directly. The results would be tempered by such an increase in the costs of the due care regime.

Proposition 2: When recovery friction exists and is held constant across the liability regimes, investor welfare in the due care regime is higher than investor welfare in the strict liability regime if the probability that the auditor will not be held liable is responsive to audit effort in the due care regime. Technically, $U^I(DC) > U^I(SL)$ if $q > 0$ and $h'(\alpha) > 0$, where DC and SL represent the due care and strict liability regimes, respectively.

Proposition 2 states that, in the presence of recovery frictions, the investor's expected payoff is higher in the due care regime than in the strict liability regime. When recovery friction exists, the investor's expected litigation cost is positive. Comparing across the liability regimes, for any given audit effort, the liability regime that has a lower expected litigation cost would result in a higher investor welfare.

The investor's expected litigation cost is determined by the audit penalty and the probability the auditor is held liable for losses. The probability that the auditor will be held liable for an erroneous report is strictly lower in the due care regime than in the strict liability regime, i.e., $I^{DC}(\cdot) < I^{SL}(\cdot)$. This smaller probability by itself leads to a lower investor expected litigation cost, i.e., *the probability effect*. To induce an audit effort in the due care regime that is equal to the optimum audit effort in the strict liability regime, the audit penalty required could either be higher or lower, i.e., *the penalty effect*. The optimum audit penalty in the strict liability regime is given by $\delta(SL) = -t'/[\{1 - \beta\}I_\alpha^{SL}]$, where $I_\alpha^{SL} = -c$. An audit penalty of $\delta(DC) = -t'/[\{1 - \beta\}I_\alpha^{DC}]$, where $I_\alpha^{DC} = -c[\{1 - \alpha\}h'(\alpha) + \{1 - h(\alpha)\}]$, induces an audit effort in the due care regime that is equal to the optimum audit effort in the strict liability regime. It follows that the audit penalty is lower in the due care regime than in the strict liability regime if $-I_\alpha^{DC} > -I_\alpha^{SL}$. Thus, if $-I_\alpha^{DC} > -I_\alpha^{SL}$, then the investor's expected litigation cost is lower in the due care regime than in the strict liability regime because of the decreased probability effect and the decreased penalty effect. Note that $-I_\alpha^{DC} > -I_\alpha^{SL}$ if and only if $h'(\cdot) > [h(\cdot)/(1 - \alpha)]$, i.e., the probability that the auditor is not held liable in the due care regime is extremely responsive to audit effort. This is similar to the finding in Narayanan (1994).

If $-I_\alpha^{DC} < -I_\alpha^{SL}$, however, $\delta(DC) > \delta(SL)$. The question then is: would the decreased probability effect dominate the increased penalty effect? The proposition shows this to be the case whenever $h'(\cdot) > 0$, which implies that investor welfare is greater in the due care regime as long as the probability that the auditor is not held liable is responsive to audit effort; it is not necessary for this probability to be extremely responsive to audit effort. The decreased probability effect dominates the increased penalty effect even when the audit penalty is higher in the due care regime than in the strict liability regime.[15]

Liability Regimes and Audit Effort

The recovery friction determines the investor's expected litigation cost. A higher level of audit effort results in a smaller number of audit failures (i.e., reporting a bad firm type as good firm type). A smaller number of audit failures in turn leads to a lower investor expected litigation cost. However, to encourage a higher level of audit effort, a higher audit penalty will be required. The higher audit penalty will lead to a greater expected litigation cost for the investor. Thus, the effect of the recovery friction on audit effort in the two liability regimes is not clear. The following observation compares the audit effort under the liability regimes.

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[15] $h'(\alpha) > 0$ implies that $-I_\alpha^{DC}/I^{DC} > -I_\alpha^{SL}/I^{SL}$. This condition is similar to the Monotone Likelihood Ratio Property (MLRP) which is an important feature in hidden-action models. For a discussion on MLRP and informativeness of outcomes on hidden-action, see Milgrom (1981).

Observation: When recovery friction exists and is held constant across the liability regimes, audit effort is higher in the strict liability regime than in the due care regime when the probability that the auditor is not held liable is sufficiently responsive to audit effort in the due care regime and the cost of the audit effort is sufficiently small. Specifically, α (SL) > α(DC) if $-I^{DC}_{\alpha\alpha}/I^{DC}_{\alpha} > [(I^{DC}_{\alpha}/I^{SL}_{\alpha})(I^{SL}/I^{DC}) - 1]\, t''/t'$, where DC and SL represent the due care and strict liability regimes, respectively.

The observation shows the existence of settings in which the audit effort is higher in the strict liability regime than in the due care regime. To understand this, let the manager's effort be fixed. By identifying the firm type as bad the auditor creates value for the investor in two ways: (1) by saving the cost of investment and loss, and (2) by saving the investor's expected litigation cost. The optimum audit effort is determined by a trade-off between the cost of the audit and the investor's expected litigation cost. In general, the investor's expected litigation cost is higher in the strict liability regime than in the due care regime (see Proposition 2). To mitigate this higher expected litigation cost, the investor finds it beneficial to increase the audit effort if the cost of the audit effort is small. Alternatively, when the probability that the auditor is not held liable is sufficiently responsive to audit effort in the due care regime, both the penalty and the probability effects lead to a lower expected litigation cost in the due care regime. Hence, the audit effort is smaller in the due care regime. This intricate trade-off between the investor's expected litigation cost and the cost of audit effort leads to situations in which audit effort is higher in the strict liability regime than in the due care regime. This lends credence to the arguments put forth by consumer advocacy groups and plaintiffs that any reduction in the auditor's liability would (1) decrease the incentive for auditors to improve audit effort and (2) decrease the ability of investors to recover losses. Note, however, that investor welfare is higher in the due care regime than in the strict liability regime (see Proposition 2).

IV. CONCLUDING REMARKS

In this paper, the due care and strict liability regimes were examined in the presence of recovery frictions. The institutional setting in which the lawyer collects a contingent fee does not enable the investor to recover all damages, yet the investor pays the auditor and the manager the expected legal liability cost. This recovery friction leads to second-best effort levels for the auditor and the manager. Investor welfare is higher in the due care regime than in the strict liability regime, if the probability that the auditor is not held liable for an erroneous audit report is responsive to audit effort in the due care regime. However, the audit effort could be lower in the due care regime than in the strict liability regime when the cost of audit effort is low.

To keep the model simple a number of aspects were not considered. For instance, the auditor's reservation pay-off was assumed to be zero. Consequently, the auditor was indifferent between the liability regimes. The insights on the effects of recovery frictions would remain qualitatively similar if the auditors get a proportion $\theta \in (0, 1)$ of the combined value $[U^A + U^I]$. Technically, more assumptions are required on the parameters to ensure concavity of the auditor's incentive constraint. Also, all players in the model are assumed to be risk-neutral. If the manager and the auditor are assumed to be risk-averse, the effects of the recovery friction would be exacerbated. In such a setting, the limited liability assumption can be relaxed and the qualitative characteristics of the insights would continue to exist.

This paper provides a framework for considering recovery frictions in auditor liability problems that can be used to address other issues relating to auditors' legal liability. Future research could be directed toward bargaining and settlement games under different liability regimes, and the impact of the regimes on audit effort in the presence of recovery friction. This framework can also be used to examine auditor independence and the complementary aspects of the manager's effort and the auditor's effort.

APPENDIX
PROOF OF PROPOSITIONS AND OBSERVATION

The arguments of the functions are suppressed in this appendix for the sake of notational convenience.

Proof of Proposition 1

The First-Best Case

First, the benchmark solution for the first-best case is derived. That is, consider program 1 without the incentive constraints (7) and (8). The Lagrangian is:

$$L(FB) = U^I + \lambda^A U^A + \lambda^M U^M,$$

where λ^A and λ^M are the Lagrange multipliers on constraints (5) and (6), respectively. Differentiating L(FB) with respect to ψ and ϕ and setting it equal to zero, it follows that $\lambda^A(FB) = \lambda^M(FB) = 1$. Differentiating L(FB) with respect to δ and γ and using $\lambda^A(FB) = \lambda^M(FB) = 1$, $L_\delta(FB) = -qcI^{DC}(1 - \beta) < 0$ and $L_\gamma(FB) = -qc(1 - \alpha)(1 - \beta) < 0$. From the Kuhn-Tucker theorem, this implies that $\gamma = \delta = 0$. Using the above results and substituting for ϕ and ψ from (5) and (6) into U^I, provides:

$$\hat{U}^I(FB) = [W(1 - v) - zv - K]\beta - (K + z)(1 - \alpha)(1 - \beta) - f - t.$$

In effect, the results that (5) and (6) are binding and that $\delta = \gamma = 0$ are used to determine U^I so that an unconstrained optimization problem given by $\max_{\alpha,\beta} \hat{U}^I(FB)$ can be considered. The optimization conditions for $\{\alpha,\beta\}$ are given by:

$$\hat{U}^I_\alpha(FB) = (K + z)(1 - \beta) - t' = 0, \tag{9}$$

$$\hat{U}^I_\beta(FB) = [W(1 - v) - zv - K] + (K + z)(1 - \alpha) - f' = 0. \tag{10}$$

The optimum $\alpha(FB)$ and $\beta(FB)$ satisfy the conditions given by (9) and (10).

The Due Care Regime

It needs to be shown that in the due care regime, the constraints in (7) and (8) are not binding iff $q = 0$. For the due care regime, the Lagrangian of program 1 is:

$$L(DC) = U^I + \lambda^A U^A + \lambda^M U^M + \mu^A U^A_\alpha + \mu^M U^M_\beta,$$

where λ^A, λ^M, μ^A and μ^M are the Lagrange multipliers on constraints (5), (6), (7) and (8), respectively. The first-order conditions for the optimum $\{\phi, \psi, \delta, \gamma\}$ are:

$$L_\phi(DC) = -1 + \lambda^A = 0,$$

$$L_\psi(DC) = -(1 - v)\beta + \lambda^M(1 - v)\beta + \mu^M(1 - v) = 0,$$

$$L_\delta(DC) = (1 - q)I^{DC}(1 - \beta) - \lambda^A I^{DC}(1 - \beta) - \mu^A I^{DC}_\alpha (1 - \beta) = 0,$$

$$L_\gamma(DC) = (1 - q)c(1 - \alpha)(1 - \beta) - \lambda^M c(1 - \alpha)(1 - \beta) + \mu^M c(1 - \alpha) = 0.$$

Solving for $\{\lambda^A, \lambda^M, \mu^A, \mu^M\}$ from the above first-order conditions gives:

$$\lambda^A(DC) = 1,$$
$$\lambda^M(DC) = \beta + (1 - q)(1 - \beta),$$
$$\mu^A(DC) = -qI^{DC}/I^{DC}_\alpha,$$
$$\mu^M(DC) = q(1 - \beta)\beta.$$

For any interior solution $\{\alpha, \beta\} \in (0, 1)$, the optimum Lagrange multipliers above imply that (5) and (6) are satisfied with equality because $\lambda^A(DC) > 0$ and $\lambda^M(DC) > 0$; and $\mu^A(DC) = \mu^M(DC) = 0$ iff $q = 0$. Thus, the first-best solution obtains iff $q = 0$.

Using $\lambda^A > 0$ and $\lambda^M > 0$, the constraints are:

$$U^A(DC) = \phi - \delta I^{DC}(1 - \beta) - t = 0,$$
$$U^M(DC) = \psi(1 - v)\beta - \gamma c(1 - \alpha)(1 - \beta) - f = 0,$$
$$U^A_\alpha(DC) = -\delta(1 - \beta)I^{DC}_\alpha - t' = 0,$$
$$U^M_\beta(DC) = \psi(1 - v) + \gamma c(1 - \alpha) - f' = 0.$$

Substituting for $\{\phi, \psi, \delta, \gamma\}$ from the constraints above in U^I gives:

$$\hat{U}^I(DC) = [W(1 - v) - zv - K]\beta - (K + z)(1 - \alpha)(1 - \beta)$$
$$- f - t - q(1 - \beta)(\beta f' - f) + qt'[I^{DC}/I^{DC}_\alpha].$$

The results are that (5) and (6) are binding and the incentive constraints (7) and (8) are used to substitute for $\{\psi, \phi, \delta, \gamma\}$ in U^I, so that an unconstrained optimization problem given by $\max_{\alpha,\beta} \hat{U}^I$ can be considered. The optimization conditions for $\{\alpha,\beta\}$ are given by:

$$\hat{U}^I_\alpha(DC) = (K + z)(1 - \beta) - t'(1 - q) + qt''[I^{DC}/I^{DC}_\alpha] - qt'[I^{DC}I^{DC}_{\alpha\alpha}/\{I^{DC^2}_\alpha\}] = 0, \quad (11)$$
$$\hat{U}^I_\beta(DC) = [W(1 - v) - zv - K] + (K + z)(1 - \alpha) - f' + q[\beta f' - f] \quad (12)$$
$$- q\beta(1 - \beta)f'' = 0.$$

The optimum $\alpha(DC)$ and $\beta(DC)$ satisfy the conditions given by (11) and (12).

Compare equations (11) and (12) with equations (9) and (10) to see that $\alpha(DC) = \alpha(FB)$ and $\beta(DC) = \beta(FB)$ if $q = 0$.

The Strict Liability Regime

Following a similar method for the strict liability regime, the optimum Lagrange multipliers are:

$$\lambda^A(SL) = 1,$$
$$\lambda^M(SL) = \beta + (1 - q)(1 - \beta),$$
$$\mu^A(SL) = -qI^{SL}/I^{SL}_\alpha,$$
$$\mu^M(SL) = q(1 - \beta)\beta.$$

For any interior solution $\{\alpha,\beta\} \in (0,1)$ the optimum Lagrange multipliers above imply that $\mu^A(DC) = \mu^M(DC) = 0$ iff $q = 0$.

Thus, for both regimes SL and DC the incentive constraints are not binding iff $q = 0$.

Note that constraints (5) and (6) are binding. Use the binding constraints to solve for $\{\phi, \psi, \delta, \gamma\}$ and substitute for $\{\phi, \psi, \delta, \gamma\}$ in U^I to get:

$$\hat{U}^{I}(SL) = [W(1 - v) - zv - K]\beta - (K + z)(1 - \alpha)(1 - \beta)$$
$$- f - t - q(1 - \beta)(\beta f' - f) + qt'[I^{SL}/I^{SL}_{\alpha}].$$

The optimization conditions for $\{\alpha,\beta\}$ are given by:

$$\hat{U}^{I}_{\alpha}(SL) = (K + z)(1 - \beta) - t'(1 - q) + qt''[I^{SL}/I^{SL}_{\alpha}] = 0, \tag{13}$$
$$\hat{U}^{I}_{\beta}(SL) = [W(1 - v) - zv - K] + (K + z)(1 - \alpha) - f' + q[\beta f' - f]$$
$$- q\beta(1 - \beta)f'' = 0. \tag{14}$$

The optimum $\alpha(SL)$ and $\beta(SL)$ satisfy the conditions given by (13) and (14).

Compare equations (11) and (12) with equations (13) and (14) to see that $\alpha(DC) = \alpha(SL)$ and $\beta(DC) = \beta(SL)$ if $q = 0$.

It follows that if $q = 0$ then $\alpha(DC) = \alpha(SL) = \alpha(FB)$ and $\beta(DC) = \beta(SL) = \beta(FB)$. Also, because for both DC and SL the constraints (5) and (6) are binding and the same audit effort and manager's effort are induced, the second part of the proposition follows. **QED.**

Proof of Proposition 2

It needs to be shown that, if $q > 0$, the investor welfare is higher in the due care regime than in the strict liability regime. Denote the optimum in the strict liability regime as $\{\alpha(SL), \beta(SL), \delta(SL), \gamma(SL), \phi(SL), \psi(SL)\}$. The optimum $\alpha(SL)$ and $\beta(SL)$ satisfy (13) and (14). From the derivation above, it is known that (5) and (6) are binding and the incentive constraints are satisfied. Use this to get:

$$\phi(SL) = t(\alpha(SL)) + \delta(SL)I^{SL}(\alpha(SL))[1 - \beta(SL)],$$
$$\psi(SL)[1 - v]\beta(SL) = \gamma(SL)c[1 - \alpha(SL)][1 - \beta(SL)] + f(\beta(SL)),$$
$$\delta(SL)I^{SL}_{\alpha}(\alpha(SL))[1 - \beta(SL)] = -t'(\alpha(SL)),$$
$$\psi(SL)[1 - v] + \gamma(SL)c[1 - \alpha(SL)] = f'(\beta(SL)).$$

Substituting for $\{\phi(SL), \delta(SL), \psi(SL), \gamma(SL)\}$ from the above yields:

$$U^{I}(SL) = [W(1 - v) - zv - K]\beta(SL) - [K + z][1 - \alpha(SL)][1 - \beta(SL)]$$
$$- f(\beta(SL)) - t(\alpha(SL)).$$

It will be shown that $\{\alpha(SL), \beta(SL), \psi(SL), \gamma(SL)\}$ can be implemented in the due care regime (i.e., are feasible) and the investor welfare is higher in the due care regime. Fix $\alpha(DC) = \alpha(SL)$; $\beta(DC) = \beta(SL)$; $\psi(DC) = \psi(SL)$ and $\gamma(DC) = \gamma(SL)$. It is easy to verify that (6) and (8) are satisfied. Choose $\delta(DC)$ to satisfy (7), i.e.:

$$\delta(DC) = -t'(\alpha(SL))[I^{DC}_{\alpha}(\alpha(SL))(1 - \beta(SL))]^{-1}. \tag{15}$$

Choose $\phi(DC)$ to satisfy (5), i.e.:

$$\phi(DC) = t(\alpha(SL)) + \delta(DC)I^{DC}(\alpha(SL))(1 - \beta(SL)). \tag{16}$$

Use $\phi(DC)$ from equation (16); $\delta(DC)$ from (15); and $\psi(SL)$ and $\gamma(SL)$ from (6) and (8) in U^{I}, to get:

$$\begin{aligned} U^I(DC) = {} & [W(1 - v) - zv - K]\beta(SL) - [K + z][1 - \alpha(SL)][1 - \beta(SL)] \\ & - f(\beta(SL)) - t(\alpha(SL)) - q[1 - \beta(SL)][\beta(SL)f'(\beta(SL)) - f(\beta(SL))] \\ & + qt'(\alpha(SL))I^{DC}(\alpha(SL))/[I^{DC}_\alpha(\alpha(SL))]. \end{aligned}$$

Now:

$$\begin{aligned} U^I(DC) - U^I(SL) &= qt'(\alpha(SL)) \left[\frac{I^{DC}(\alpha(SL))}{I^{DC}_\alpha(\alpha(SL))} - \frac{I^{SL}(\alpha(SL))}{I^{SL}_\alpha(\alpha(SL))}\right], \\ &= \frac{qt'(\alpha(SL))h'(\alpha(SL))[1 - \alpha(SL)]^2}{[1 - h(\alpha(SL))]} > 0, \end{aligned}$$

where $h'(\cdot) > 0$, $t'(\cdot) > 0$ and $\{\alpha(SL), \beta(SL)\} \in (0,1)$ is used to obtain the last inequality.

Thus, any solution for the strict liability regime can be implemented in the due care regime at a lower cost of litigation; hence, investor welfare is greater in the due care regime.

More generally, without the assumptions on $h'(\cdot)$, $U^I(DC) > U^I(SL)$ if:

$$\left[\frac{I^{DC}(\alpha(SL))}{I^{DC}_\alpha(\alpha(SL))} - \frac{I^{SL}(\alpha(SL))}{I^{SL}_\alpha(\alpha(SL))}\right] = \frac{I^{SL}(\alpha(SL))}{I^{DC}_\alpha(\alpha(SL))}\left[\frac{I^{DC}(\alpha(SL))}{I^{SL}(\alpha(SL))} - \frac{I^{DC}_\alpha(\alpha(SL))}{I^{SL}_\alpha(\alpha(SL))}\right] > 0.$$

$I^{SL}(\alpha(SL)) > 0$ and $I^{DC}_\alpha(\alpha(SL)) < 0$; this implies that $U^I(DC) > U^I(SL)$ if:

$$-\frac{I^{DC}_\alpha(\alpha(SL))}{I^{DC}(\alpha(SL))} > -\frac{I^{SL}_\alpha(\alpha(SL))}{I^{SL}(\alpha(SL))}. \tag{17}$$

If $h'(\cdot) > 0$ then the condition in equation (17) is satisfied. Equation (17) can be compared to the Monotone Likelihood Ratio Property (MLRP). **QED.**

Proof of Observation

Fix $\alpha(DC) = \alpha(SL)$ and $\beta(DC) = \beta(SL)$ and evaluate (11) and (12). Note that (12) is satisfied while (11) [where (SL) is suppressed for notational convenience]:

$$\begin{aligned} \hat{U}^I_\alpha(DC) &= -qt'' \frac{I^{SL}}{I^{SL}_\alpha} + qt'' \frac{I^{DC}}{I^{DC}_\alpha} - qt' \frac{I^{DC}I^{DC}_{\alpha\alpha}}{I^{DC^2}_\alpha}, \\ &= -qt' \frac{I^{DC}}{I^{DC}_\alpha}\left[\frac{t''}{t'}\left\{\frac{I^{SL}I^{DC}_\alpha}{I^{DC}I^{SL}_\alpha} - 1\right\} + \frac{I^{DC}_{\alpha\alpha}}{I^{DC}_\alpha}\right] \\ &= -\Lambda < 0, \end{aligned}$$

where the last inequality follows using the condition $-I^{DC}_{\alpha\alpha}/I^{DC}_\alpha > [t''/t'] \{I^{SL}I^{DC}_\alpha/I^{DC}I^{SL}_\alpha - 1\} > 0$, and $I^{DC}_\alpha < 0$.

The optimum $\alpha(DC)$ and $\beta(DC)$ need to satisfy (11) and (12). It has been shown that under the stated condition evaluating (11) at $\{\alpha(SL), \beta(SL)\}$, provides $\hat{U}^I_\alpha(\alpha(SL), \beta(SL)) = -\Lambda < 0$. Also, evaluating (12) at $\{\alpha(SL), \beta(SL)\}$, provides $\hat{U}^I_\beta(\alpha(SL), \beta(SL)) = 0$.

Perturb $\alpha(SL)$ by ε_α and $\beta(SL)$ by ε_β. ε_α and ε_β need to be chosen such that (11) and (12) are satisfied at equality.

From (11) and (12):

$$\hat{U}^{I}_{\alpha\alpha}(DC)d\varepsilon_{\alpha} + \hat{U}^{I}_{\alpha\beta}(DC)d\varepsilon_{\beta} = \Lambda > 0,$$
$$\hat{U}^{I}_{\alpha\beta}(DC)d\varepsilon_{\alpha} + \hat{U}^{I}_{\beta\beta}(DC)\varepsilon_{\beta} = 0.$$

Therefore, the solution $d\varepsilon_{\alpha}$ and $d\varepsilon_{\beta}$ is:

$$d\varepsilon_{\alpha} = \frac{\Lambda\hat{U}^{I}_{\beta\beta}(DC)}{\hat{U}^{I}_{\alpha\alpha}(DC)\hat{U}^{I}_{\beta\beta}(DC) - \hat{U}^{I2}_{\alpha\beta}(DC)}$$
$$d\varepsilon_{\beta} = -\frac{\Lambda\hat{U}^{I}_{\alpha\beta}(DC)}{\hat{U}^{I}_{\alpha\alpha}(DC)\hat{U}^{I}_{\beta\beta}(DC) - \hat{U}^{I2}_{\alpha\beta}(DC)}.$$

For any locally interior optimum the necessary Kuhn-Tucker second-order conditions satisfy $\hat{U}^{I}_{\alpha\alpha}(DC) < 0$, $\hat{U}^{I}_{\beta\beta}(DC) < 0$ and $\hat{U}^{I}_{\alpha\alpha}(DC)\hat{U}^{I}_{\beta\beta}(DC) - \hat{U}^{I2}_{\alpha\beta}(DC) > 0$. Also, $\hat{U}^{I2}_{\alpha\beta}(DC) = -(K + z) < 0$. Using these relationships and $\Lambda > 0$, $d\varepsilon_{\alpha} < 0$ and $d\varepsilon_{\beta} > 0$.

Thus, under the stated condition $\alpha(DC) < \alpha(SL)$ and $\beta(DC) > \beta(SL)$. **QED.**

REFERENCES

Alexander, J. C. 1991. Do the merits matter? A study of settlements in security class actions. *Stanford Law Review* 43 (3): 497–598.

Balachandran, B., and N. J. Nagarajan. 1987. Imperfect information, insurance, and auditors' legal liability. *Contemporary Accounting Research* 3 (2): 281–301.

Chan, C. K., and S. Pae. 1998. An analysis of the economic consequences of the proportionate liability rule. *Contemporary Accounting Research* (forthcoming).

Gode, D. K. 1993. An analysis of auditor's legal liability. Working paper, GSIA, Carnegie Mellon University, Pittsburgh, PA.

Melumad, N. D., and L. Thoman. 1990. On auditors and the courts in an adverse selection setting. *Journal of Accounting Research* 28 (1): 77–120.

Milgrom, P. 1981. Good news and bad news: Representation theorems and applications. *Bell Journal of Economics* 12 (2): 380–391.

Narayanan, V. G. 1994. An analysis of auditor liability rules. *Journal of Accounting Research* 32 (Supplement): 39–59.

Nelson, J., J. Ronen, and L. White. 1988. Legal liabilities and the market for auditing services. *Journal of Accounting, Auditing and Finance* 3 (3): 255–295.

Polinsky, A. M., and Y. Che. 1991. Decoupling liability: Optimal incentives for care and litigation. *RAND Journal of Economics* 22 (4): 562–570.

Sappington, D. 1983. Limited liability contracts between principal and manager. *Journal of Economic Theory* 29 (1): 1–29.

Sarath, B. 1991. Uncertain litigation and liability insurance. *RAND Journal of Economics* 22 (2): 218–231.

Schwartz, R. 1997. Legal regimes, audit quality and investment. *The Accounting Review* 72 (3): 385–406.

———. 1998. Auditors' liability, vague due care and auditing standards. *Review of Quantitative Finance and Accounting* 11 (2): 183–207.

Shavell, S. 1980. Strict liability versus negligence. *The Journal of Legal Studies* 9 (1): 1–25.

———. 1987. *Economic Analysis of Accident Law*. Cambridge, MA: Harvard University Press.

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BOOK REVIEWS

Thomas H. Williams, Editor

Editor's Note: Two copies of books for review should be sent to Professor Thomas H. Williams, McIntire School of Commerce, University of Virginia, Charlottesville, VA 22903-2493. The policy of *The Accounting Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.

ALNOOR BHIMANI, Editor, *Management Accounting: European Perspectives* (Oxford, U.K.: Oxford University Press, 1996, xv, 250, Hb).

Not all 15 members of the European Union (EU) have agreed to use the new monetary unit, the Euro, and neither do all members follow the same management accounting practices. The amazing variety of practices, differences in business structure, divergent management traditions and different competitive conditions faced by EU members have influenced their approaches to management accounting, and this book gives U.S. readers a glimpse of this wide diversity in European management accounting practices.

The editor, Alnoor Bhimani, (and author of the chapter on U.K. management accounting) has persuaded management accounting scholars from 11 EU countries (not the same 11 who make up the monetary union) to write about management accounting practices in their own countries. The chapter on Finnish management accounting is written by authors from Finland, and the chapter on management accounting in Greece is written by Greeks, etc. Several authors give a short history or background of business practices and conditions in their countries before describing management accounting. These comments provide some of the most interesting reading in the book. For example, in France over one-half the top executives in French companies are engineers; in Greece over 99 percent of the companies employ fewer than 50 people; in 1948 Denmark had only 500 companies with more than 100 employees; many Belgian companies are family owned; and large Swedish companies generate less than 10 percent of their sales in Sweden.

Several authors tell about scholars or practitioners in their countries who significantly influenced the development of management accounting in their countries. In Denmark, Vagn Madsen and Palle Hansen developed ideas on variable costing and contribution reporting that had a significant impact on practices in that country. In Italy, Gino Zappa argued that no product cost could be computed without specifying the context in which the cost would be used, and he argued that all costs were interrelated so that variations in one affect all the others; his ideas still influence management accounting in Italy today. In the Netherlands, Theodore Limperg argued that net income represents the amount of cash the owners can remove from the business without endangering the continuation of the firm (shades of free cash flow). Finally, the U.K. had *Factory Accounts* written by Emile Garcke and John Fells as its starting point in cost accounting. Since these countries had native thinkers who influenced the evolution of management accounting in their respective countries, one would expect to find different practices in these countries—and one does.

For example, the chapter on Germany explains how companies use imputed costs for interest and current cost for depreciable assets; it describes elaborate systems for assigning costs to products and to cost centers; and, it explains the details of the standard cost systems used by German companies. In contrast, companies in Finland appear to largely follow a variable cost approach to product costing and management reporting, and the French companies use a *Tableau de Bord* system for monitoring and managing performance. The *Tableau de Bord* (literally this means the dashboard of a car) provides a set of indicators that allows a manager to control the physical and human assets under his or her control, much like a system for monitoring the critical success factors of a business. Only at top company levels does this French system utilize data from the accounting system. Spanish companies have only recently become interested in management accounting; only 11 management accounting articles were published in Spain prior to 1960. Finally, Italian firms that do allocate overhead use a variety of drivers for spreading the overhead; they assign the overhead to different pools and then choose a driver for each overhead pool that measures the services consumption of that overhead pool.

Who should read this book and how should they read it? First, every doctoral student studying management accounting should be familiar with this book because it shows that companies use many different approaches to designing management accounting systems, and it shows that different circumstances influence company choice of a system. A number of authors tell how management accounting changed in their country when markets were freed from government controls and company managers had to cope with market forces instead of government regulations. One can read the chapters from back to front, front to back, or in random order; it makes no difference since each stands alone. If one gets bored with a chapter, one can just skip to the next chapter where different authors will talk about a different country.

The editor has done a remarkable job of making the material in the chapters flow smoothly, no easy task when one is dealing with people from ten different countries who do not speak English as their native language. English may be the language of business, but if one does not speak it every day it requires significant effort from both authors and editor to compose well-written manuscripts in the language.

This was a fun book to read—not a comment one can make about most accounting books.

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MICHAEL J. COMER, *Corporate Fraud*, (Hampshire, England: Third Edition, Gower Publishing Limited, 1998, xviii, 676, Hb $110.95)

This book provides an excellent overview of all core components of prevalent corporate frauds. Mr. Comer identifies, explains and provides many practical examples based on his 30+ years of related work experience as an auditor, fraud investigator and consultant in the United Kingdom. His text appears to be an ideal supplement for an undergraduate or graduate auditing course and could be used as a main text for an elective course in fraud.

Part one of the book addresses the background and nature of corporate fraud. Key components of this section include: common misconceptions, concealment methods and high-risk areas of concerns to accountants, auditors and management. He discusses, in a fair amount of detail, a wide range of fraudulent acts and methods of perpetration used by employees, vendors and other external parties. The next section of the book focuses on primary and secondary detection mechanisms.

Part two covers what Comer refers to as "critical point auditing" and other auditing approaches that effectively address white-collar crime. A relatively unsophisticated, but systematic method of inspecting accounting records and documents is what the author refers to as critical path auditing (cpa). A significant amount of information with regard to purchasing, accounts receivable, sales and marketing fraud schemes is explained in this section. Also, the author includes an abundance of charts, graphs and exhibits, which at times appears to be overemphasized. The following section of this book moves to the area of fraud investigation.

Interview skills, exploration methods and general approaches to fraud examination are explored in part three. Different interrogation techniques, British legal statutes and behavioral components of fraud are explained in an easy-to-follow methodology. Numerous fraudster profiles are detailed and methods of achieving confessions from suspects are identified.

The final part of the book includes many sample policies and procedures that companies can use to contain fraud in the workplace. Key examples of common management, organizational and information technology controls are reviewed. Additionally, Internet and public information sources are provided to give the reader supplemental methods of data gathering.

Throughout the book the author expounds on the need for a strong set of coordinated audit, risk management, legal and compliance functions to aid organizations in minimizing the occurrence of fraud and successfully managing fraud investigations when they occur. This need is explained for the benefit of internal and external audit practitioners, senior management and shareholders. Recent fraud cases such as BCCI, Maxwell and Barings Bank are used throughout the book to highlight the impact that fraud has on business. In summary, I feel academicians, students and practitioners will find this book to be both interesting and useful.

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DOUGLAS T. HICKS, *ACTIVITY-BASED COSTING: Making It Work for Small and Mid-Sized Companies,* Second Edition (New York, NY: John Wiley & Sons, Inc., 1999, xix, 357, Hb $65.00).

This book describes the nature and use of "activity-based" cost information in terms understandable to the accountant and nonaccountant alike. The author focuses on the "activity-based" laws of nature that relate to the behavior of costs in small to mid-sized businesses. He claims that "activity-based costing" (ABC) is the concept to adopt, not the system to install, strongly implying that there cannot be uniform "activity-based costing systems" for varied firms; instead each system should be designed for firm-specific characteristics in terms of activities.

The first section (chapters one and two) depicts some general issues regarding ABC. The first chapter begins with a discussion of the first ten years of ABC and how it has fallen short of the acceptance levels that the soundness of the concept should have led it to attain. In chapter two, by presenting the "Strange Case of Ace Manufacturing," he expounds how the firm in the case improved its cost system from traditional costing practices by making piecemeal corrections.

The second section (chapters three through nine) illustrates the theory of ABC. Chapter three discusses the definition of activity-based costing, showing its relevance for small and mid-sized organizations. In chapter four, the author distinguishes the role of the generally accepted accounting principles (GAAP) from that of the decision costing information data. The purpose of GAAP is not to provide cost information that is useful in helping management make its day-to-day and strategic decisions. In chapter five, the framework that can be used to build an accurate cost flow-down structure for any business is described. The author considers all organizations are service organizations from an ABC perspective since we should measure the cost of all services being provided to each cost objective as it goes through the line. Chapter six is used to present a case study of Acme Distributors that distributes a variety of merchandise to big retail chains and small individual retailers. Acme Distributors was able to make giant steps in its understanding of customer profitability as well as the costs involved in some of its more critical processes through a great deal of intellectual energy and a little bit of physical energy. Chapter seven illustrates the varied applications of ABC, such as pricing decisions, long-term contracts, capital expenditure decisions and so on. The ability to determine the incremental costs resulting from a possible decision derived from the ABC framework is critical to sound decision making. The author claims that any incorporation of ABC concepts that fails to provide a model that will enable management to accurately determine these incremental costs will fall short in achieving the concept's purpose. Chapter eight provides a package of practical activity-based modeling tools. In the subsequent chapter, two case studies are furnished to tell the readers that cost flow-down structures are unique to each organization; there is no "one size fits all" solution.

The third section (chapters ten through 13), as a practical application for building the ABC model, illustrates how all this theory can be used to develop a spreadsheet-based cost accumulation and distribution model of a company. Chapter ten describes building a cost accumulation model; there are a variety of ways to develop a model, i.e., the structure of the model depends on the complexity of the organization being modeled. Chapter 11 describes a case situation at Small Time Manufacturing, which is a small contract manufacturer. The subsequent two chapters provide step-by-step instructions for building a cost accumulation and distribution model that will enable Small Time Manufacturing to develop both the fully absorbed and incremental costs. Building the model is subject to the constraint that the model being built must be put to use in making Small Time Manufacturing a more profitable organization.

The fourth section (chapters 14 through 16) illustrates how the concept of ABC, supported by an activity-based cost accumulation and distribution model, can be used to provide management with accurate and relevant decision costing information. Continuing the Small Time Manufacturing example, the author explains how ABC can be used to support product pricing decisions and product line drop/add decisions in chapter 14. In chapter 15, he shows how the model can be used in a "what if" mode to support capital expenditure decisions, direct continuous improvement efforts and to evaluate "special order" opportunities. In chapter 16, he presents how the model can be used to support multiyear pricing decisions.

The final section (chapters 17 and 18) describes some impediments to the adoption of ABC by small and mid-sized organizations. The author summarizes the need for an approach to activity-based cost information at small and mid-sized businesses. He recommends that ABC should be learned, not taught, because the structure of the ABC model depends on firm-specific characteristics.

The book should prove to be primarily interesting for those in the top management level of small and mid-sized firms because they are the ones who will decide to employ ABC in their cost accounting system. As long as the benefit that can be reaped from using ABC is proven to be greater than the cost to be incurred to utilize it, more people in the top management level in small and mid-sized firms are likely to adopt ABC.

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BOOKS RECEIVED NOVEMBER 1, 1998 TO JANUARY 15, 1999

A. RASHAD ABDEL-KHALIK, ed., *Encyclopedic Dictionary of Accounting* (Malden, MA: Blackwell Publishers Ltd, 1998, xi, 308, Pb $29.95).

TERESA ANDERSON, NABIL ELIAS, and DANIEL ZÉGHAL, *Environmental Management and Reporting* (Vancouver, Canada: Certified General Accountants' Association of Canada, 1998, xii, 216, Pb).

STEVEN M. BRAGG, *Managing Explosive Corporate Growth* (New York, NY: John Wiley & Sons, Inc., 1999, xii, 324, Hb $34.95).

JAMES A. BRIMSON and JOHN ANTOS, *Activity-Based Management: For Service Industries, Government Entities, and Nonprofit Organizations* (New York, NY: John Wiley & Sons, Inc., 1998, xii, 364, Pb $39.95).

JAMES A. BRIMSON and JOHN ANTOS, *Driving Value Using Activity-Based Budgeting* (New York, NY: John Wiley & Sons, Inc., 1999, xii, 276, Hb $65).

BARRY J. EPSTEIN and ABBAS ALI MIRZA, *IAS 99: Interpretation and Application of International Accounting Standards* (New York, NY: John Wiley & Sons, Inc., 1999, 886, Pb $65).

FASB, *Current Text,* 1998-99 edition, Vol. I (New York, NY: John Wiley and Sons, Inc., 1998, Pb $48.95).

FASB, *Original Pronouncements,* 1998-99 edition, 2 Volumes (New York, NY: John Wiley and Sons, Inc., 1998, Pb $48.95 each).

MICHAEL H. GRANOF, *Government and Not-For-Profit Accounting: Concepts and Practices* (New York, NY: John Wiley & Sons, Inc., 1998, xvi, 703, Hb $93.95).

DAN M. GUY and D. R. CARMICHAEL, *Practitioner's Guide to GAAS 99* (New York, NY: John Wiley & Sons, Inc., 1998, Pb $62).

DAN M. GUY and D. R. CARMICHAEL, *The 1999 Student's GAAS Guide* (New York, NY: John Wiley & Sons, Inc., 1999, Pb $55.95).

DOUGLAS T. HICKS, *Activity-Based Costing: Making It Work for Small and Mid-Sized Companies,* 2nd edition (New York, NY: John Wiley & Sons, Inc., 1999, xix, 357, Hb $65).

MARGARET LEVENSTEIN, *Accounting for Growth: Information Systems and the Creation of the Large Corporation* (Stanford, CA: Stanford University Press, 1998, xiv, 277, Hb $49.50).

MARY S. LUDWIG, *Accounts Payable: A Guide to Running an Efficient Department* (New York, NY: John Wiley & Sons, Inc., 1999, xviii, 366, Pb $105).

GARY JOHN PREVITS, ed., *Research in Accounting Regulation, Vol. 12* (Stamford, CT: JAI Press Inc., 1998, xv, 340, Hb $78.50).

AHMED RIAHI-BELKAOUI, *Significant Current Issues in International Taxation* (Westport, CT: Quorum Books, 1998, xiv, 183, Hb $59.95).

J. TIMOTHY SALE, ed., *Advances in International Accounting, Vol. 11* (Stamford, CT: JAI Press Inc., 1998, ix, 239, Hb $78.50).

Editorial Data

Manuscripts submitted to *The Accounting Review* are assigned two reviewers. The following table contains information about turnaround time for reviewed manuscripts for the 12-month period ended November 30, 1998. Turnaround time is the number of days between the date of the editor's letter to the author(s) and the date that the manuscript and submission fee were received:

	Number of Manuscripts	Cumulative Number	Cumulative Percent
0 ≤ Days ≤ 30	8	8	3.7
31 ≤ Days ≤ 60	40	48	22
61 ≤ Days ≤ 90	135	183	83.9
91 ≤ Days ≤ 120	33	216	99
121 ≤ Days	2	218	100

The mean review time was 72 days; the median review time was 74 days. A limited number of manuscripts are returned without review and such manuscripts are excluded from the turnaround time statistics reported above.

EDITORIAL POLICY AND STYLE INFORMATION

EDITORIAL POLICY

According to the policies set by the Publications Committee (which were endorsed by the Executive Committee and were published in the *Accounting Education News*, June 1987), *The Accounting Review* "should be viewed as the premier journal for publishing articles reporting the results of accounting research and explaining and illustrating related research methodology. The scope of acceptable articles should embrace any research methodology and any accounting-related subject, as long as the articles meet the standards established for publication in the journal....No special sections should be necessary. The primary, but not exclusive, audience should be—as it is now—academicians, graduate students, and others interested in accounting research."

The primary criterion for publication in *The Accounting Review* is the significance of the contribution an article makes to the literature.

The efficiency and effectiveness of the editorial review process is critically dependent upon the actions of both authors submitting papers and the reviewers. Authors accept the responsibility of preparing research papers at a level suitable for evaluation by independent reviewers. Such preparation, therefore, should include subjecting the manuscript to critique by colleagues and others and revising it accordingly prior to submission. The review process is not to be used as a means of obtaining feedback at early stages of developing the research.

Reviewers and associate editors are responsible for providing critically constructive and prompt evaluations of submitted research papers based on the significance of their contribution and on the rigor of analysis and presentation. Associate editors also make editorial recommendations to the editor.

MANUSCRIPT PREPARATION AND STYLE

The Accounting Review's manuscript preparation guidelines follow (with a sight modification) the B-format of the *Chicago Manual of Style* (14th ed.; University of Chicago Press). Another helpful guide to usage and style is *The Elements of Style*, by William Strunk, Jr., and E. B. White (Macmillan). Spelling follows *Webster's International Dictionary*.

FORMAT

1. All manuscripts should be typed on one side of 8½ × 11" good quality paper and be double spaced, except for indented quotations.
2. Manuscripts should be as concise as the subject and research method permit, generally not to exceed 7,000 words.
3. Margins of at least one inch from top, bottom and sides should facilitate editing and duplication.
4. To assure anonymous review, authors should not identify themselves directly or indirectly in their papers. Single authors should not use the editorial "we."
5. A cover page should show the title of the paper, the author's name, title and affiliation, any acknowledgments, and a footnote indicating whether the author would be willing to share the data (see last paragraph in this statement).

Pagination: All pages, including tables, appendices and references, should be serially numbered. The first section of the paper should be untitled and unnumbered. Major sections may be numbered in Roman numerals. Subsections should not be numbered.

Numbers: Spell out numbers from one to ten, except when used in tables and lists, and when used with mathematical, statistical, scientific, or technical units and quantities, such as distances, weights and measures. For example: *three days; 3 kilometers; 30 years*. All other numbers are expressed numerically.

Percentages and Decimal Fractions: In nontechnical copy use the word percent in the text.

Hyphens: Use a hyphen to join unit modifiers or to clarify usage. For example: *a well-presented analysis; re-form*. See *Webster's* for correct usage.

Key Words: The abstract is to be followed by four key words that will assist in indexing the paper.

ABSTRACT/INTRODUCTION

An Abstract of about 100 words should be presented on a separate page immediately preceding the text. The Abstract should concisely inform the reader of the manuscript's topic, its methods and its findings. Key Words and the Data Availability statements should follow the Abstract. The text of the paper should start with a section labeled "I. Introduction," which provides more details about the paper's purpose, motivation, methodology and findings. Both the Abstract and the introduction should be relatively non-technical, yet clear enough for an informed reader to understand the manuscript's contribution. The manuscript's title, but neither the author's name nor other identification designations, should appear on the Abstract page.

TABLES AND FIGURES

The author should note the following general requirements:

1. Each table and figure (graphic) should appear on a separate page and should be placed at the end of the text. Each should bear an Arabic number and a complete title indicating the exact contents of the table or figure.
2. A reference to each graphic should be made in the text.
3. The author should indicate by marginal notation where each graphic should be inserted in the text.
4. Graphics should be reasonably interpreted without reference to the text.
5. Source lines and notes should be included as necessary.

Equations: Equations should be numbered in parentheses flush with the right-hand margin.

DOCUMENTATION

Citations: Work cited should use the "author-date system" keyed to a list of works in the reference list (see below). Authors should make an effort to include the relevant page numbers in the cited works.

1. In the text, works are cited as follows: authors' last name and date, without comma, in parentheses: for example, (Jones 1987); with two authors: (Jones and Freeman 1973); with more than two: (Jones et al. 1985); with more than one source cited together (Jones 1987; Freeman 1986); with two or more works by one author: (Jones 1985, 1987).
2. Unless confusion would result, do not use "p." or "pp." before page numbers: for example, (Jones 1987, 115).
3. When the reference list contains more than one work of an author published in the same year, the suffix a, b, etc. follows the date in the text citation: for example, (Jones 1987a) or (Jones 1987a; Freeman 1985b).
4. If an author's name is mentioned in the text, it need not be repeated in the citation; for example, "Jones (1987, 115) says...."
5. Citations to institutional works should use acronyms or short titles where practicable; for example, (AAA ASOBAT 1966); (AICPA Cohen Commission Report 1977). Where brief, the full title of an institutional work might be shown in a citation: for example, (ICAEW The Corporate Report 1975).
6. If the manuscript refers to statutes, legal treatises or court cases, citations acceptable in law reviews should be used.

Reference List: Every manuscript must include a list of references containing only those works cited. Each entry should contain all data necessary for unambiguous identification. With the author-date system, use the following format recommended by the *Chicago Manual*:

1. Arrange citations in alphabetical order according to surname of the first author or the name of the institution responsible for the citation.
2. Use author's initials instead of proper names.
3. Date of publication should be placed immediately after author's name.
4. Titles of journals should not be abbreviated.
5. Multiple works by the same author(s) in the same year are distinguished by letters after the date.
6. Inclusive page numbers are treated as recommended in *Chicago Manual* section 8.67.

Sample entries are as follows:

American Accounting Association, Committee on Concepts and Standards for External Financial Reports. 1977. *Statement on Accounting Theory and Theory Acceptance*. Sarasota, FL: AAA.

Demski, J. S., and D. E. M. Sappington. 1989. Hierarchical structure and responsibility accounting. *Journal of Accounting Research* 27 (Spring): 40–58.

Dye, R., B. Balachandran, and R. Magee. 1989. Contingent fees for audit firms. Working paper, Northwestern University, Evanston, IL.

Fabozzi, F., and I. Pollack, eds. 1987. *The Handbook of Fixed Income Securities.* 2nd edition. Homewood, IL: Dow Jones-Irwin.

Kahneman, D., P. Slovic, and A. Tversky, eds. 1982. *Judgment Under Uncertainty: Heuristics and Biases.* Cambridge, U.K.: Cambridge University Press.

Porcano, T. M. 1984a. Distributive justice and tax policy. *The Accounting Review* 59 (October): 619–636.

———. 1984b. The perceived effects of tax policy on corporate investment intentions. *The Journal of the American Taxation Association* 6 (Fall): 7–19.

Shaw, W. H. 1985. Empirical evidence on the market impact of the safe harbor leasing law. Ph.D. dissertation, University of Texas at Austin.

Sherman, T. M., ed. 1984. *Conceptual Framework for Financial Accounting.* Cambridge, MA: Harvard Business School.

Footnotes: Footnotes are not used for documentation. Textual footnotes should be used only for extensions and useful excursions of information that if included in the body of the text might disrupt its continuity. Footnotes should be consecutively numbered throughout the manuscript with superscript Arabic numerals. Footnote text should be doubled-spaced and placed at the end of the article.

SUBMISSION OF MANUSCRIPTS

Authors should note the following guidelines for submitting manuscripts:

1. Manuscripts currently under consideration by another journal or publisher should not be submitted. The author must state that the work is not submitted or published elsewhere.
2. In the case of manuscripts reporting on field surveys or experiments, four copies of the instrument (questionnaire, case, interview plan or the like) should be submitted.
3. Four copies should be submitted together with a check in U.S. funds for $75.00 for members or $100.00 for nonmembers of the AAA made payable to the American Accounting Association. Effective January 1990, the submission fee is nonrefundable.
4. The author should retain a copy of the paper.
5. Revisions must be submitted within 12 months from request, otherwise they will be considered new submissions.

COMMENTS

Comments on articles previously published in *The Accounting Review* will be reviewed (anonymously) by two reviewers in sequence. The first reviewer will be the author of the original article being subjected to critique. If substance permits, a suitably revised comment will be sent to a second reviewer to determine its publishability in *The Accounting Review*. If a comment is accepted for publication, the original author will be invited to reply. All other editorial requirements, as enumerated above, also apply to proposed comments.

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APRIL 1999 PLACEMENT ADS

The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication. The ***Review*** *is published on the first day of January, April, July and October. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 34233-2399, ATTENTION: ADVERTISING DEPT. All replies to box numbers should be on separate sheets to facilitate forwarding.*

201 UNIVERSITY OF MARYLAND AT COLLEGE PARK invites applications for tenure-track faculty positions in accounting at all levels, especially in the areas of Financial Accounting, Auditing, and Accounting Systems, to start August 1999. Published research (including at the Assistant entry level) commensurate with the level of the appointment is required of all candidates. Please send a vita, three letters of recommendation, and evidence of research to Professor Oliver Kim, The Robert H. Smith School of Business, University of Maryland, College Park, MD 20742. The University of Maryland is an Equal Opportunity/Affirmative Action Employer. Women and minorities are especially encouraged to apply.

202 OGLETHORPE UNIVERSITY, a selective private liberal arts institution located in Atlanta, Georgia, invites applications for a tenure-track faculty position in Accounting beginning Fall 1999. Ph.D./D.B.A. in Accounting preferred; ABD within one year of completion considered. Professional certification and experience is desirable. Teaching interests in either Financial Accounting/Auditing or Managerial Accounting/Systems will be considered. Normal teaching load is three courses per semester. Commitment to quality instruction and intellectual contributions, service and active involvement in campus life are expected. Applications consisting of a statement of teaching and research interests, academic vita, and contact information for at least three professional references should be submitted to Dr. James M. Turner, Oglethorpe University, 4484 Peachtree Road NE, Atlanta, GA 30319-2797. Applications should be received by March 1, 1999. Please visit our web site at: www.oglethorpe.edu. EOE.

203 RUTGERS UNIVERSITY SCHOOL OF BUSINESS–CAMDEN, invites applications for a visiting faculty position in Accounting. The candidate should be capable of high quality research and teaching at both the undergraduate and graduate levels. The school is AACSB accredited. The teaching load for visiting faculty is generally three sections per semester. Salary is competitive and commensurate with qualification. The University is located in Southern New Jersey and is less than two miles from downtown Philadelphia, with easy access to New York and Washington, D.C. The positions will remain open until filled. Rutgers University values diversity and encourages women and ethnic minorities to apply. Interested candidates should send resumes to Peter Theodossiou, The Accounting and Finance Area Coordinator, School of Business, Rutgers University, Camden, NJ 08102. Phone: (609) 225-6594. Rutgers University is an Affirmative Action/Equal Opportunity Employer.

204 THE GEORGE WASHINGTON UNIVERSITY's School of Business and Public Management, Department of Accountancy, invites applications for two Assistant Professors beginning Fall 1999. Preferred but not required teaching areas are in Managerial Accounting and Information Systems. A relevant doctoral degree is required. Strong ABD candidates will be considered only if degree requirements are completed prior to the appointment date. Potential or demonstrated commitment to teaching excellence and scholarly research is expected. Please send a letter of application, a current resume, three faculty recommendation letters, and evidence of research to Professor Debra R. Sheldon, Chair, Department of Accountancy, School of Business and Public Management, The George Washington University, Washington, D.C. 20052. The George Washington University is an Equal Opportunity/Affirmative Action Employer.

205 COST ACCOUNTANT. Mark VII, the world's leading manufacturer of touch-free car wash equipment, is seeking an individual with knowledge of cost accounting methods, principles and practices to perform cost accounting functions in an accurate and timely manner. Other responsibilities include computing unit cost of company products/services and establishing cost standards; determining product, and research and development costs; and assisting in other aspects of maintenance of cost finding and reporting system. Requirements include a Bachelor's degree in Accounting; 2–4 years' experience in a manufacturing environment; and strong communication skills. Mark VII has been serving the industry for over 30 years and rewards driven individuals with an excellent career opportunity, and compensation and benefits program. Please fax/mail resume, with cover letter and salary history, to Mark VII Equipment, Inc., 5981 Tennyson Street, Arvada, CO 80003, Fax: (303) 430-0139. EOE.

206 STATE UNIVERSITY OF NEW YORK, College at Fredonia is recruiting for an Assistant Professor–Accounting. Professional rank and salary range are competitive. Ph.D. or D.B.A. in Accounting required. CPA and work experience preferred. Applicant must demonstrate research potential and teaching excellence. Teaching responsibilities include undergraduate courses in Financial Accounting, Accounting Information Systems and other courses. The position also requires academic advising, participation in departmental governance, service, and research. The successful applicant will demonstrate research potential and teaching excellence, possess strong communication skills, and compliment existing strengths. Teaching workload will consist of three or four courses per semester, depending upon responsibilities. Please visit our web site at www.fredonia.edu. Applicants should respond with a letter of application and vita to Jane Romal, Chair, Department of Business Administration, SUNY College at Fredonia, Fredonia, NY 14063. State University of New York is an Equal Opportunity/Affirmative Action Employer.

207 HUNTER COLLEGE–CUNY invites applications for a tenure-track position in Accounting at the rank of Assistant Professor beginning Fall 1999. Applicants must have a Ph.D. or be close to completing a doctoral program in the areas of Auditing, Managerial Accounting and Financial Accounting. The Department of Economics offers an undergraduate major in Accounting and B.A./M.A. in economics, and is proposing a Master of Science in Accounting through its Accounting Program. Subject to approval, the M.S. program will begin in Fall 2000. The Accounting Program seeks a balance between high-quality teaching and research productivity. Salary ranges are: Instructor $29,409–$43,134; and Assistant Professor $32,062–$51,266. Please forward curriculum vita, three letters of recommendation and evidence of recent research activity to Dr. John J. Kim, Department of Economics, Hunter College–CUNY, 695 Park Avenue, New York, NY 10021. Hunter College is an Equal Opportunity/Affirmative Action/American Disability Act Employer and is committed to a diversified faculty. Women and minorities are encouraged to apply.

208 THE COLLEGE OF NEW JERSEY is seeking an Assistant Professor in Accountancy in a tenure-track appointment. Required: an earned doctorate in Accounting from an AACSB-accredited school or an ABD with completion prior to September 1, 1999. Candidate should have a specialty in Managerial/Cost Accounting. Evidence of quality undergraduate and/or graduate teaching and scholarship is expected. Professional certification is desirable. Applications will be accepted until the position is filled. Please send vita, graduate transcripts, teaching evaluations and a list of references to Dr. Joao Neves, Associate Dean for Faculty Affairs, School of Business, The College of New Jersey, PO Box 7718, Ewing, NJ 08628-0718. To enrich education through diversity, The College of New Jersey is an EEO/AA/ADA employer M/F/D/V.

209 UNIVERSITY OF SOUTH CAROLINA, School of Accounting, invites applicants for a tenure-track position for the Fall 1999. Our need is an Assistant Professor with a primary interest in Auditing and secondary interest in Financial Accounting, but we will accept applications from all ranks and areas. Applicants must possess a doctorate or be close to completion by August 1999. The School of Accounting has approximately 400 undergraduate majors (Juniors and Seniors) and 60 Masters' students, and offers B.S., Masters' of Accountancy, Masters' of Taxation, and Ph.D. degrees. Please submit a résume and a working paper or a defended dissertation proposal, if at the dissertation stage. Applications will be accepted until the position is filled. The University of South Carolina is an Affirmative Action/Equal Opportunity Institution. Submit applications to Professor Robert A. Leitch, School of Accounting, The Darla Moore School of Business, University of South Carolina, Columbia, SC 29208.

210 WINSTON-SALEM STATE UNIVERSITY, Division of Business and Economics. Tenure-track, Assistant/Associate Professor of Accounting position available Fall 1999. Doctorate in Accounting or related field and excellent oral and written English communications skills required. Desirable: primary teaching interest in Financial Accounting; secondary interest in Tax, Auditing or AIS; strong commitment to development of students' written communication skills; promising research potential. Salary is AACSB competitive. Apply by February 8, 1999 for full consideration. Please send a letter of application, vita, three letters of reference and official transcripts to Dr. Arthur T. King, Director, Division of Business and Economics, Winston-Salem State University, 601 Martin Luther King, Jr. Drive, Winston-Salem, NC 27110. Email: Kinga@wssumits.wssu.edu. WSSU is one of the 16 constituent institutions of the University of North Carolina and enrolls approximately 2,800 students. WSSU is an Equal Opportunity Employer and encourages applications from women, minorities and persons with handicaps.

211 HARVARD INSTITUTE FOR INTERNATIONAL DEVELOPMENT (HIID) is seeking an Accounting Specialist for a two-year project in Addis Ababa, Ethiopia. Will assist government in designing a strategy for reforming federal and regional-level accounts. Will also assist government in implementing reform strategy by providing guidance in procedural reform, training, documentation and reform management. Will be establishing accounting training programs for government staff. Will be expected to travel to the regions. This position is grant funded and a term appointment till 1/1/01. Candidates will have an educational background in Accounting and have a CPA, should also have substantial experience in development of training programs for government bookkeepers and accountants. Minimum of 4 years of experience in developing countries and implementation experience are preferred. Experience with government accounting systems required. Send resumes to HIID Professional Recruitment-ACCTSP, 14 Story Street, 4th Floor, Cambridge, MA 02138.

212 UNIVERSITY OF WAIKATO MANAGEMENT SCHOOL, Hamilton, New Zealand. We are interested in hosting strong, active accounting researchers who seek 3–9 month sabbatical leave placements. The department has a good research record with publications in the past three years in AOS, AAAJ, CPA, BAR, etc. We would welcome the stimulation and energy that could be provided by a fresh perspective from an active researcher willing to share and collaborate. We can provide excellent office facilities with state-of-the-art technology access, full accommodation for an academic and partner, but we simply do not have the funding to offer an attractive financial package. On the other hand, New Zealand is a great place to visit especially for those keen on outdoor activities. Those interested should contact Dr David Coy (dcoy@waikato.ac.nz) Co-Chairperson of Accounting. More information about the Waikato Management School and the Department of Accounting is available at the web site: http://www.mngt.waikato.ac.nz.

213 STANFORD UNIVERSITY Graduate School of Business invites applications for a tenured Associate Professor position in Accounting, effective as early as September 1999. We especially seek candidates interested in Managerial Accounting and areas that will diversify our group's teaching and research portfolio. Candidates must have a Ph.D. and a high level of accomplishment in both scholarly research and graduate-level (M.B.A. and Ph.D.) teaching. Applications should include curriculum vita, copies of research publications, and three confidential letters of reference. Applications must be forwarded in their entirety to the Faculty Recruiting Coordinator, Box A, Graduate School of Business, Stanford University, Stanford, CA 94305-5015. Deadline for receipt of materials is May 1, 1999. Stanford University is an Equal Opportunity Employer and seeks applications from women and ethnic minorities.

214 UNIVERSITY OF SASKATCHEWAN is seeking applications for tenure-track or visiting positions in all areas of Accounting at any rank beginning July 1999. Applicants should possess a relevant doctorate or be in the final stages of completion. Professional certification is preferred. A commitment to teaching excellence and publishing research in quality journals is required. Three degree programs in Accounting are offered: Bachelor's, a research-based Masters' and a professionally oriented Masters'. In 1999, a new building providing state-of-the-art teaching facilities will be available. The city of Saskatoon, population 205,000, offers an abundance of parks, recreational and cultural activities, and close proximity to pristine lakes and a national park. The University is committed to the principles of employment equity. Qualified women are especially encouraged to apply. Applicants should submit a resume, three letters of reference, examples of research, and teaching evaluations to R. M. Lindsay, Department of Accounting, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, S7N 5A7.

215 HOPE COLLEGE invites applications for a tenure-track position at the Assistant/Associate Professor level, beginning August 1999. Teaching responsibilities (3 courses/semester) include some combination of Principles of Financial and Managerial Accounting, Intermediate Accounting, Cost Accounting, Advanced Accounting, Governmental and Non-for Profit Accounting, and Accounting Ethics. A Ph.D. in Accounting or an M.B.A./CPA and professional work experience in Accounting is required. Hope College is a Christian coeducational, residential, liberal arts undergraduate college affiliated with the Reformed Church in America; has over 2,900 students and 219 FTE faculty; is in a rapidly growing urban area of 100,000, near Lake Michigan. Additional information about Hope College can be found on the web at http://www.hope.edu. Hope College complies with federal and state requirements for nondiscrimination in employment. Applications from and nominations of women and minority group members are especially welcomed. A letter of application, curriculum vita, official transcripts, and three current letters of recommendation should be sent to Dr. James B. Heisler, Chairperson, Department of Economics and Business Administration, Hope College, PO Box 9000, Holland, MI 49422-9000.

216 UNIVERSITY OF MICHIGAN–DEARBORN, School of Management invites applications for two tenure-track Accounting positions, available September 2000. Primary field of interest in Taxation and in Financial Accounting. Rank through Associate Professor available to candidate possessing Ph.D./D.B.A. in Accounting. Professional certification preferred. The successful applicant will be dedicated to quality teaching, research and service. Two years related professional experience and one year teaching experience desirable. Salary is competitive. Support for research and professional development is available. The School is AACSB accredited and offers B.B.A. and M.B.A. degrees. An M.B.A. Accounting Concentration and an M.S.A. are in the approval process for Fall 1999. Send letter of application, vita, graduate transcript and three letters of reference to Julie Dziekan, Assistant Dean, School of Management, University of Michigan–Dearborn, Dearborn, MI 48128-1491. Application deadline is October 15, 1999. The University of Michigan–Dearborn is an Affirmative Action/Equal Opportunity Employer and specifically encourages women and minority applicants.

217 UNIVERSITY OF DELAWARE, Department of Accounting and Management Information Systems, is seeking an Assistant/Associate Financial Accounting faculty member capable of both quality research and teaching at the undergraduate and graduate level. The University of Delaware, ranked 25th among the nation's top public universities by U.S. News & World Report, is located on a beautiful campus in Newark, Delaware. The Department of Accounting and MIS is part of the College of Business & Economics, which serves approximately 1,700 undergraduate majors and 670 graduate students. Representatives will be attending the AAA Convention in San Diego. Qualified candidates should send a vita, three letters of reference, and summaries of teaching performance to Dr. Kent St. Pierre, Chairperson, Department of Accounting & MIS, College of Business & Economics, University of Delaware, Newark, DE 19716. Deadline for applications is July 1, 1999. The University is an Equal Opportunity Employer, which encourages applications from minority group members and women.

218 UNIVERSITY OF DELAWARE, Department of Accounting and Management Information Systems, is seeking an Accounting Information Systems faculty member at the Assistant/Associate level, capable of both quality research and teaching at the undergraduate and graduate level. The University of Delaware, ranked 25th among the nation's top public universities by U.S. News & World Report, is located on a beautiful campus in Newark, Delaware. The Department of Accounting & MIS is part of the College of Business & Economics, which serves approximately 1,700 undergraduate majors and 670 graduate students. Representatives will be attending the AAA Convention in San Diego. Qualified candidates should send a vita, three letters of reference, and summaries of teaching performance to Professor Clinton White, Search Committee, Department of Accounting & MIS, College of Business & Economics, University of Delaware, Newark, DE 19716. Deadline for applications is July 1, 1999. The University of Delaware is an Equal Opportunity Employer, which encourages applications from minority group members and women.

219 MOREHEAD STATE UNIVERSITY invites applications for two tenure-track positions of Assistant Professor of Accounting beginning August 1999. Responsibilities: teach 9 to 12 hours per semester of undergraduate and possibly graduate courses in Accounting, including courses in Financial Accounting and Accounting Information Systems; conduct academic research; participate in professional development activities; and perform university service. Once employed, this individual will likely be required to teach some courses using distance learning technology on an "as needed" basis. Qualifications: Doctorate in Accounting or completed within first academic year. Desired qualifications: Knowledge of and experience using distance learning technologies. To apply, submit letter of application, vita and references to Office of Human Resources, Attn: Acct.#166, Morehead State University, HM 101, Morehead, KY 40351. Position is open until filled. MSU is an EO/AA employer.

220 UNIVERSITY OF SAN DIEGO, School of Business, is seeking applications for a tenure-track appointment at the Assistant or Associate Professor levels for the 2000–2001 academic year. Ph.D. is required, ABD considered. The strongest needs are in Managerial Accounting, Accounting Information Systems and Auditing, but all areas are encouraged to apply. Qualified candidates with specific industry experience in high technology, sports, entertainment, government, military, family business or procurement/supply management are preferred. Two years of guaranteed summer research support are generally available. The university is a private institution with approximately 6,700 students. It is located on a mesa overlooking the Pacific Ocean. The business school is AACSB accredited. Please send your resume to Dr. Loren Margheim, School of Business, University of San Diego, 5998 Alcala Park, San Diego, CA 92110-2492. Email: margheim@acusd.edu. Representatives will be available at the AAA meeting in San Diego. The University of San Diego is an Equal Opportunity Employer committed to excellence through diversity. Female and minority candidates are strongly urged to apply.

221 NATIONAL DONG HWA UNIVERSITY's Department of Accounting invites applications for two positions in Accounting effective August 1, 1999. The rank is open. Applicants should possess a Ph.D. in Accounting or expect completion of Ph.D. program by the end of the 1998–99 academic year. They should also specialize in at least one of the following two fields; Financial Accounting and Management Accounting; and one of the following three fields: Auditing, Tax Law and Accounting, and Accounting Information System. The positions will remain open until filled. Please send letter of application, resume, three letters of recommendation, examples of recent scholarly work, and a copy of transcript for Ph.D. program to Dr. Young Hang Chang, Department of Accounting, National Dong Hwa University, Hualien, Taiwan. Telephone: +886-3-8562500, Ext. 1771 or 1772; Fax: +886-3-8663367.

222 CLARK UNIVERSITY, Assistant or Associate Professor of Accounting. Candidates should hold a Ph.D. in Accounting with either the CPA or CMA and must have a strong interest in doing quality research. Appointments at the rank of Associate Professor will be considered for applicants with recognized accomplishments in research. Teaching duties include courses in Financial Accounting, Information Systems or Auditing. Clark is a small, selective university, which fosters an unusual combination of academic rigor and close working relationships with students. The M.B.A. and baccalaureate degrees are accredited by the AACSB. Clark's location in central Massachusetts (40 miles from Boston) offers an exceptionally rich cultural life and the natural beauty of New England. The position (approval expected) will be available on September 1, 2000. Professor Dileep Dhavale will conduct initial interviews of candidates at the AAA Annual Meeting in San Diego. Please send your c.v. to Graduate School of Management, Clark University, 950 Main Street, Worcester, MA. 01610-1477 or email: ddhavale@clarku.edu.

223 UNIVERSITY AT ALBANY, SUNY, Department of Accounting and Law is seeking applications for tenure-track faculty positions at the Assistant/Associate Professor level for Fall 1999. The position requires a completed Ph.D. or D.B.A. Faculty members generally teach six hours per semester and are expected to actively pursue a program of scholarly research. Applications from all specializations are welcome but preference will be given to candidates with a research interest in Accounting Information Systems and Computer Risk Assurance. The University at Albany is an Equal Opportunity/Affirmative Action Employer. Please send application letter and vita to Dr. David Marcinko, Chair, Department of Accounting, The University at Albany, Albany, NY 12222.

香港中文大學
THE CHINESE UNIVERSITY OF HONG KONG

Faculty Positions in the School of Accountancy

As a comprehensive university, The Chinese University of Hong Kong offers programmes up to PhD level in the Humanities, Business Administration, Education, Engineering, Medicine, Science and Social Science (including Architecture). The University has a large and scenic campus in the region (over 134 hectares), occupying a hillside in the New Territories facing Tolo Harbour. The University is very active in promoting research and consultancies and in liaising with the industrial and business sectors worldwide.

The School of Accountancy is one of six academic departments in the Faculty of Business Administration. All six departments have established outstanding academic reputation, and in recent surveys, the MBA programme at The Chinese University has been consistently rated among the top in Asia. As a pioneer and leader in accounting education in Hong Kong and Asia since 1963, the School has established an excellent reputation for professional education and research. We offer BBA, MAcc, MPhil and PhD degrees in accountancy. Our business and accounting programmes are very much sought-after in Hong Kong. Our 560 accounting major students are of first class calibre and our over 2,500 accounting graduates consistently shine professionally in the Asia Pacific region. The conversion to a professional school in 1993 further consolidated our efforts and propelled CUHK's accounting programmes into international prominence.

To further enhance our role as an international center for excellent accounting education and research, established and promising accounting scholars in all fields of accounting around the world are invited to join our strong and devoted faculty team. The School currently has 24 full-time and several visiting academic staff. Applications are now invited for the posts of Lecturer (carrying the academic title of Assistant Professor or Associate Professor, as appropriate) or Senior Lecturer (carrying the academic title of Associate Professor or Professor, as appropriate). Applicants should have a PhD (or nearing completion). An accounting professional qualification or other relevant certification is desirable but not necessary. Candidates must be willing to teach at undergraduate and postgraduate levels, as well as day-time and evening classes. Commitment to teaching excellence, quality scholarly research and School/University service is required. The medium of instruction is English and/or Chinese. Full-time and part-time Teaching Assistants are employed to assist teachers in teaching and research activities.

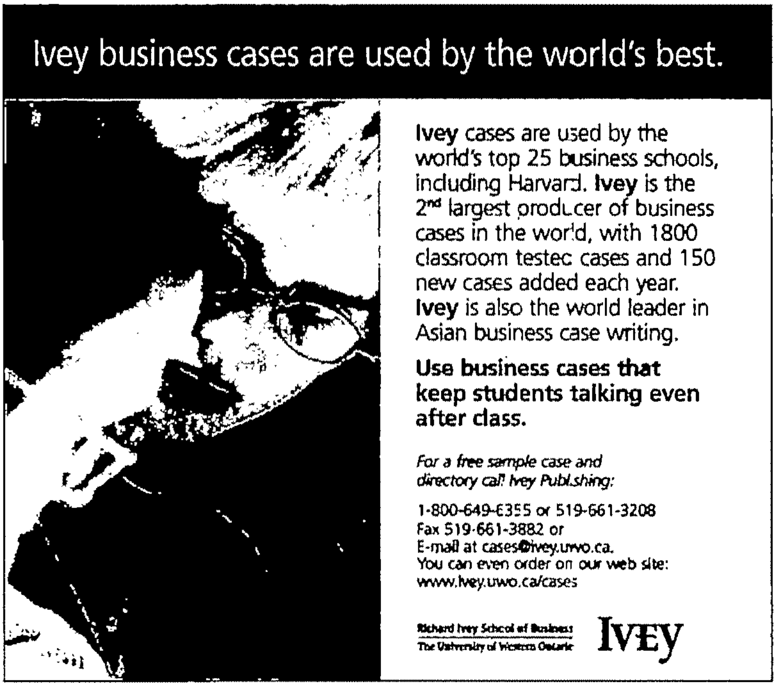
The range of annual salary (12 months) is approximately from US$71,000 to $119,000 for appointment at the grade of Lecturer and from US$111,000 to $149,000 at the grade of Senior Lecturer. Starting salary and grade will be commensurate with qualifications and experience. Benefits include leave with full pay, medical and dental care, education allowance for children and housing benefits. Appointment will initially be made on fixed-term contract basis for up to three years and will carry a contract-end gratuity (up to 15% of basic salary) where appropriate.

Applications with full resume in duplicate and names and addresses (fax numbers/e-mail addresses as well where available) of three referees should be addressed to Professor Simon S.M. Ho, Director, School of Accountancy, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong. Please quote the reference number 98/066(020)/2 and mark *"Recruitment - Confidential"* on cover. Details about the University and the School can be found in our Web site: http://www.cuhk.edu.hk/acy. For additional information please fax (number 852-2603-6604) or e-mail <simon@baf.msmail.cuhk.edu.hk> to the School of Accountancy. Applications will be accepted until positions are filled.

The Hong Kong Polytechnic University
Department of Accountancy

Position Openings—Assistant, Associate, or Full Professor

Candidates must have a PhD in hand (or be near completion), evidence of teaching ability and a strong research track record/potential. Practical professional experience and professional designation will be an advantage. Although we have stronger needs in the financial and managerial areas, other expertise will be considered for candidates with outstanding credentials. Faculty members are free to pursue any areas of research, but those interested in applying rigorous research paradigms to China-related research issues will find the Department's network and resources particularly helpful. In the year past, members in our department published in such places as *JAE, CAR, JFQA, AH, JAAF, JBFA*. **Visiting positions** are also available for individuals who can make a contribution toward improving the quality and quantity of our research output. Please direct all inquiries to Joseph Cheung by email [acjoe@inet.polyu.edu.hk], phone [(852) 2766-7046], fax [(852) 2365-9303], or post [Department of Accountancy, The Hong Kong Polytechnic University, Hung Hom, Hong Kong]. For further information about us, please visit our web site [http://www.polyu.edu.hk/acct/].



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PENNSTATE

DEPARTMENT OF ACCOUNTING
CHAIRPERSON

The Pennsylvania State University is seeking a Chairperson for its Department of Accounting to begin July 1, 2000. The responsibilities are to: Support and provide leadership for the research programs of the department's faculty and curriculum refinement of Ph.D., Master's, and baccalaureate degree programs; enhance external relations with the business community; and maintain internal relations with other academic units in the university. Candidates should understand the effects of rapid technological changes on accounting education and business practice. Candidates should possess a record that demonstrates a commitment to research and higher education and a strong desire to continue to build the reputations of the Accounting Department and the Smeal College of Business Administration. The individual should possess credentials appropriate for a tenured appointment at the rank of professor. Send vita and references to Professor Charles H. Smith, Chairman, Search Committee, 206 Beam Building, University Park, PA 16802-1912. The Search Committee will continue to review applications and nominations until the position is filled. More information about the Smeal College of Business Administration is available on the World Wide Web at http://www.smeal.psu.edu.

Penn State is committed to affirmative action,
equal opportunity and the diversity of its workforce.

Wharton

The Department of Accounting
The Wharton School
The University of Pennsylvania
Announces a Position Opening

The Wharton School of The University of Pennsylvania invites applications for a Full-Professor position in the Accounting Department. The University seeks candidates who have outstanding credentials and qualifications including:

- A documented record of excellence in teaching both managerial and financial accounting
- A distinguished and on-going record of scholarship and publication in the area of managerial accounting, including its interface with financial accounting
- Ability to assume a leadership role and collaborate with colleagues in teaching, scholarship and service activities at the department, school and university level
- A record of working with, supervising and developing doctoral students

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Early Evidence on the Informativeness of the SEC's Market Risk Disclosures: The Case of Commodity Price Risk Exposure of Oil and Gas Producers

Shivaram Rajgopal
University of Washington

ABSTRACT: The paper provides early evidence on the informativeness of commodity price risk measures required by the Securities and Exchange Commission's new market risk disclosure rules (SEC 1997). I use existing disclosures of oil and gas producers (O&G) to obtain proxies for the tabular and sensitivity analysis disclosures required by the new SEC rules. I find that proxies for the tabular and the sensitivity analysis format are significantly associated with O&G firms' stock return sensitivities to oil and gas price movements. This finding casts doubt on claims that the new market risk disclosures do not reflect firms' risk exposures. The proxies for the tabular format and sensitivity format disclosures are not substitutable explanations of firms' risk exposures. This evidence suggests that disclosures from one disclosure format are not comparable to those from the other reporting format.

Key Words: *Derivatives disclosure, Market risk, Oil and Gas, SEC.*

This paper is based on my dissertation completed at the University of Iowa. I am especially grateful to my advisor, Dan Collins, for his guidance. I would like to thank my committee members, Mort Pincus, Charles Wasley, Anand Vijh and Forrest Nelson for their comments. I am grateful to two anonymous referees for their valuable suggestions. The paper has greatly benefited from discussions with Ramji Balakrishnan, Dave Burgstahler, Terry Shevlin and Mohan Venkatachalam. I would also like to thank David Aboody, Shlomo Benartzi, Tom Linsmeier, Joshua Livnat, K. Ramesh, Steve Ryan, D. Shores, Jim Wahlen and workshop participants at the University of California, Los Angeles, Carnegie Mellon University, Emory University, University of Iowa, Indiana University, University of Minnesota, New York University, Penn State University, University of Pittsburgh, Washington University and the University of Washington for their comments. I thank Walter Teets at the Securities Exchange Commission for providing access to the report released by the Senate Subcommittee on Securities on April 21, 1997.

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Data Availability: *A list of sample firms is available from the author. The data used in the study can be obtained from public sources.*

I. INTRODUCTION

In this paper, I provide early evidence that commodity price risk disclosures similar to those required by the Securities and Exchange Commission's new market risk disclosure rules (hereafter, SEC 1997) are associated with stock market-based measures of commodity price risk exposure.[1] Effective June 15, 1998, SEC (1997) requires companies to disclose quantitative information about their market risk exposure stemming from derivatives and underlying nonderivative items. Firms are free to choose one of three reporting options to make these disclosures: (1) tabular presentation (describing fair value and contract terms), (2) sensitivity analysis (describing potential change in fair values and other losses under various market fluctuations) and (3) value at risk (describing a summary statistical measure of potential loss within a historical context).

While the SEC concludes that such "quantitative disclosures should help investors better understand specific market risk exposures of different registrants" (SEC 1997, 6048), critics have argued that quantitative market risk disclosures are likely to be unreliable and plagued with measurement problems. Logan and Montgomery (1997) testified before a U.S. Senate Subcommittee on SEC (1997) that "under the SEC rule, investors are unlikely to understand a company's derivative use and risk any better; in fact, the disclosures could be misleading." Echoing similar concerns, the AICPA has ruled that the sensitivity analysis disclosure alternative is too dependent on assumptions and hypothetical information for accountants to be able to certify the accuracy of such disclosures in comfort letters to underwriters (AICPA 1998).

Concerns have also been expressed that providing firms with three options for quantitative market risk reporting is likely to limit investors' ability to compare one firm with another and consequently affect the usefulness of the new disclosures. For example, Lehn (1997) testified before the Senate Subcommittee that the "menu of disclosure options calls into question how helpful the disclosed information will be to investors." The U.S. Senate Subcommittee (1997) noted that two similar companies, with very similar derivatives portfolios and strategies, could have very different quantitative analyses because of the alternative reporting options allowed.

There are two important questions related to the new disclosure requirements: (1) Are the SEC (1997) market risk disclosures associated with market-based measures of exposure? (2) Are risk disclosures from one format comparable with disclosures from another format? However, there are limitations on our ability to answer these two questions. Question (1) cannot now be evaluated with firm disclosures under SEC (1997) because these data are not yet available. Question (2) cannot be evaluated with firm disclosures under SEC (1997) even when such data become available because firms are unlikely to make disclosures under more than one allowed format. I provide early evidence on question (1) and relevant evidence on question (2). To provide such evidence, I use currently available information on oil and gas (O&G) firms as proxies for some disclosures required under SEC (1997) and determine whether these proxies are associated with firms' stock-price sensitivity to the risk associated with changes in oil and gas prices. In particular, I focus on a sample of O&G

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[1] SEC (1997, 6044) defines market risk as the risk of loss arising from adverse changes in market rates and prices, such as interest rates, foreign currency rates, commodity prices and similar market rate or price changes (e.g., equity prices).

producers and assess whether risk measures generated from Statement of Financial Accounting Standards (SFAS) No. 69, *Disclosures about Oil and Gas Producing Activities* and SFAS No. 119, *Disclosures about Fair Values of Derivative Financial Instruments and Fair Values of Financial Instruments* (FASB 1982, 1994) are associated with O&G firms' stock-price sensitivities to changes in oil and gas prices (hereafter, oil and gas betas). Focusing on O&G firms is advantageous because they have relatively clear price risk exposures that are commonly managed with derivative commodity instruments. Moreover, O&G firms report measures of derivative use and underlying commodity price risk exposure under SFAS No. 119 and SFAS No. 69, respectively.[2] Such measures proxy for the required SEC (1997) disclosures.

In this paper, commodity price risk disclosures are evaluated based upon their ability to reflect firms' exposures to commodity price risk. The O&G firms in my sample do not ordinarily disclose whether they view commodity price risk exposure in terms of changes in fair values, future earnings, or future cash flows. The tests in this paper examine the association between commodity risk disclosures and the sensitivities of firm equity returns to changes in oil and gas prices. These tests evaluate the commodity price risk disclosures given that commodity price risk exposure is measured by changes in fair value. I have chosen to emphasize the changes in fair value perspective of commodity price risk exposure for three reasons. First, fair values already capture (present values) of future earnings and future cash flows, albeit with some measurement error. Second, data adapted from SFAS No. 69 and SFAS No. 119 disclosures can be readily used to empirically measure fair value exposure. However, data to estimate the sensitivity of future earnings to oil and gas price changes are not readily available. Third, available disclosures restrict my ability to unambiguously infer whether firms define exposure in terms of future cash flows, future earnings, or fair values. The mean sample firm hedges a small portion of its reserves (3.86 percent of oil reserves and 7.81 percent of gas reserves) suggesting that firms possibly hedge earnings and cash flows from next year's production. However, there is evidence to indicate that sample firms consider longer term exposures as well. For instance, 63 percent of the derivative contracts in the sample are written to hedge reserves for more than one year with some contracts valid for ten years into the future. Further, Clinch and Magliolo (1992) show that proven reserves to be produced as far down as three years from now are positively associated with current year's oil price sensitivities. Such evidence of long-term exposures provides some justification for defining exposures in terms of fair value. The consequences of evaluating disclosures by their ability to reflect the exposure of the firm to fair values changes because of changes in oil and gas prices need to be kept in mind. For example, the absence of an association between a monitored disclosure and the sensitivities of firm returns to oil and gas prices would not suggest that the monitored disclosure would fail to reflect risk exposure if exposure is thought of in terms of changes in earnings or cash flows.

The tests in the paper concentrate on commodity price risk disclosures under two alternate disclosure formats required by SEC (1997): tabular disclosure and sensitivity analysis.[3] The tabular format requires firms to disclose fair values of derivative commodity instruments and enough information about the contract terms to estimate expected cash flows. SEC (1997) encourages firms to disclose similar information voluntarily about their underlying commodity price risk exposure. The stated goal of tabular information is to allow users to make their own assessments of a firm's market risk exposure. In this study, the notional values of hedged reserves reported under SFAS No. 119 represent one component of the contract terms that investors would use to estimate the expected cash flows of the derivative commodity instruments.[4] Proven oil and gas reserves reported per SFAS No. 69 valued at year-end oil and gas prices are used to proxy for the firm's commodity risk exposures under the tabular format of risk disclosures. For a sample of 149 firm-years for the period 1993 to 1996, I find that the proxy for tabular format measures of commodity derivative activity is negatively associated with firms' oil and gas betas. The proxy for the tabular format measures of underlying exposure, namely proven reserves, exhibits positive significant associations with oil and gas betas only for those firms whose proven reserve estimates are perceived by the market to contain less measurement error than the estimates of the median firm.

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[2] Underlying price risk exposure refers to the exposure that stems from nonderivative items.

[3] Although SEC (1997) allows firms to choose the value-at-risk format, credible proxies for value-at-risk measures are not readily available from extant financial statements of my sample firms. Such data requires frequent time-series observations of the fair values of a firm's commodity derivatives, its underlying exposures and operating factors that affect such fair value changes (see, Linsmeier and Pearson 1997).

The sensitivity analysis format of SEC (1997) requires firms to report explicit estimates of fair value gains and losses on derivative commodity instruments due to changes in the prices of the underlying commodity. In addition, the SEC encourages firms to voluntarily present fair value gains and losses on the underlying exposure due to changes in prices. In this paper, I use SFAS No. 119 disclosures of fair value gains and losses on O&G derivative instruments as a firm-specific estimate of the commodity price sensitivity of derivative commodity instruments. I use the oil and gas price-induced change in the SFAS No. 69 present values of future cash flows to estimate the price sensitivity of the underlying exposure. For a subsample of 89 firm-years over the period 1993 to 1996, I find that these proxies for the fair value sensitivity of underlying exposure (commodity derivatives) exhibit significant positive (negative) association with oil and gas betas. This finding is not consistent with claims made in comment letters (SEC, 1997, IV[4]) and the position taken by AICPA (1998) that sensitivity analysis disclosures do not reliably measure firms' market risk exposures.

I find that the sensitivity analysis proxies and the tabular disclosure proxies each possess incremental utility for explaining oil and gas betas. Hence, the information from the two different disclosure formats are not complete substitutes for one another; they each reflect different aspects of firm risk exposures as captured by oil and gas betas. This finding is consistent with concerns expressed by the U.S. Senate Subcommittee (1997) that the choice among alternative forms of quantitative disclosures may limit comparability among companies. As stated earlier, this analysis is especially important because it cannot be readily conducted later using official SEC (1997) disclosures as firms are not required to report risk exposures under more than one disclosure format.

Overall, the paper's results confirm that the commodity price risk disclosures similar to those required by SEC (1997) are, in general, associated with the market's perception of oil and gas price sensitivity. The interpretation of this association is subject to the same cautions that apply to all association results. The association of SEC (1997)-like risk measures with firms' oil and gas price sensitivities has to be viewed as a necessary, but not sufficient, condition for the usefulness of such disclosures. Such association, by itself, does not demonstrate the incremental utility of these risk measures to investors. For example, equivalent information may be available to the market from sources other than the footnote disclosures used in the paper. It is also unclear whether financial statement disclosure is the most cost-effective source of this information. However, early evidence that some risk measures that proxy for the disclosures required by SEC (1997) are associated with firms' underlying exposures does suggest that the disclosures will not be misleading as some critics have claimed.

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[4] The notional value of a derivative contract represents the face or the contractual value of such a contract. Fair value of a derivative represents the present values of the amounts that the firm is expected to receive or pay on the derivative contract.

The remainder of the paper is organized as follows. Sections II and III outline the research designs for testing the association between oil and gas betas with the tabular and sensitivity analysis disclosures of firms' net commodity price risk exposure. Section IV describes the sample and data used in the paper. Section V reports the results, and section VI concludes.

II. TABULAR FORMAT DISCLOSURES

The tabular disclosure alternative requires presentation of information about fair values and contract terms sufficient to determine the expected cash flows of derivative commodity instruments outstanding at the end of a reporting period. The stated goal of the tabular disclosure format is to allow users to derive their own estimates of a firm's market risk exposure (SEC 1997, 6049). The sample tabular disclosure suggested by SEC (1997) for commodity price sensitivity (adapted for O&G producers) is reproduced in exhibit 1. The sample disclosure format provides an example of how an O&G firm might comply with disclosure requirements under the tabular format. As shown, companies may report the notional quantity of oil and gas sold forward using a futures contract, the weighted average settlement price per unit of oil and gas sold forward, the notional value and the fair value of the futures contract. The sample disclosure also includes a voluntary disclosure of the carrying amount and fair value of underlying oil and gas proven reserves.

Under the tabular format, a firm's underlying exposure is estimated as the fair value of its proven oil and gas reserves.[5] I express the portion of the market value of a firm's equity that is sensitive to oil and gas price changes as the sum of the fair value of proven reserves and the fair value of commodity derivatives. Thus, I assume that the contribution to a firm's equity value from items other than proven reserves and commodity derivatives is independent of changes in oil and gas prices and, hence, forms part of the firm-specific error term. I then derive a parsimonious empirical relation between the sensitivity of equity values to changes in oil and gas prices and two contract terms related to underlying exposure and derivatives that may be presented under the tabular format: (1) proven oil and gas reserves valued at year-end spot oil and gas prices and (2) the notional value of oil and gas sold forward using derivative contracts. I expect significant associations between the sensitivity of equity values to changes in oil and gas prices and the two items of tabular information if the items reflect commodity risk or firm efforts to reduce that risk.

An Empirical Relation Between Tabular Information and a Market-Based Measure of Risk Exposure

For simplicity, consider an O&G firm that has no gas reserves. At time t, the firm's market value of equity (MVE) is the sum of the fair value of its oil inventory proxied by proven oil reserves ($FV_{oil,u}$) and the fair value of its short oil derivatives position ($FV_{oil,d}$) and an error term representing components of MVE assumed to not vary with oil prices:

$$MVE_t = FV_{oil,u,t} + FV_{oil,d,t} + error_t. \tag{1}$$

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[5] The adapted exhibit 1 lists the fair value of proven oil and gas reserves under the caption "on balance sheet exposure" although proven SFAS No. 69 reserve measures used in this study to proxy for fair value of proven oil and gas reserves are disclosed in footnotes and not on the balance sheet.

EXHIBIT 1
SEC's (1997) Tabular Disclosure Format for Commodity Price Sensitivity

The table below provides information about the Company's oil and gas inventory and futures contracts that are sensitive to changes in oil and gas prices. For inventory, the table presents the carrying amount and fair value at December 31, 19X1 of the firm's oil and gas reserves. For futures contracts, the table presents the notional amounts in barrels and million cubic feet, the weighted average contract prices and the total dollar contract amount by expected maturity dates, the latest of which occurs one year from the reporting date. Contract amounts are used to calculate the contractual payments and quantity of oil and gas to be exchanged under the futures contracts.

December 31, 19X1

	Carrying Amount (in millions)	*Fair Value (in millions)*
On-Balance-Sheet Commodity Position and Related Derivatives		
Oil Inventory[a]	$XXX	$XXX
Gas Inventory[a]	$XXX	$XXX
	Expected Maturity 19X2	*Fair Value*
Related Derivatives		
Oil Futures Contracts (Short):		
Contract volumes (100,000 barrels)	XXX	
Weighted Average Price (Per barrel)	$X.XX	
Contract Amount ($ US in millions)	$XXX	$XXX
Gas Futures Contracts (Short):		
Contract volumes (100,000 million cubic feet)	XXX	
Weighted Average Price (Per cubic foot)	$X.XX	
Contract Amount ($ US in millions)	$XXX	$XXX

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[a] SEC (1997) encourages but does not mandate disclosure of the on-balance-sheet commodity position. On-balance-sheet commodity position refers to the underlying nonderivative items.

Consider the fair value of a firm's proven oil reserves. The Hotelling valuation principle (HVP), developed by Miller and Upton (1985a), has been used in prior research (e.g., Magliolo 1986; Clinch and Magliolo 1992) to express the fair value of a firm's reserves as a function of reserve quantity and current oil price. In particular, the Hotelling valuation principle states that the fair value of a firm's reserves is the product of its oil reserve quantity and current oil price (p_{oil}), net of current extraction cost (c):

$$FV_{oil,u,t} = (p_{oil,t} - c_t) \times \text{oil reserve quantity}_t. \tag{2}$$

Let Δp_{oil} be a small change in oil price from time t to t + 1. The corresponding change in the fair value of reserves from time t to time t + 1 ($\Delta FV_{oil,u}$), assuming that reserve quantity and extraction cost do not change in response to a small change in oil price, is:[6]

$$\Delta FV_{oil,u} = \Delta p_{oil} \times \text{oil reserve quantity}_t. \quad (3)$$

The fair value of a derivatives contract the firm uses to assume a short position in oil can be approximated as the product of the notional quantity of reserves sold short and the current oil price, net of the strike price of the derivatives contract (p_s):

$$FV_{oil,d,t} = (p_{oil,t} - p_s) \times \text{oil notional quantity-short}_t. \quad (4)$$

Because the strike price p_s is a constant, change in the fair value of the derivatives contract in response to a small change in oil price from time t to time t + 1 ($\Delta FV_{oil,d}$) is:[7]

$$\Delta FV_{oil,d} = \Delta p_{oil} \times \text{oil notional quantity-short}_t. \quad (5)$$

The next step is to combine the change in fair value of reserves and the derivatives contract into one expression:

$$\begin{aligned} \Delta MVE &= \Delta FV_{oil,u} + \Delta FV_{oil,d} \\ &= \Delta p_{oil} \times (\text{oil reserve quantity}_t + \text{oil notional quantity-short}_t). \end{aligned} \quad (6)$$

In equation (6), ΔMVE represents the change in market value of equity from time t to t + 1. Multiplying and dividing equation (6) by $p_{oil,t}/(MVE_t \times \Delta p_{oil})$ yields:

$$\begin{aligned} (\Delta MVE/MVE_t)/(\Delta p_{oil}/p_{oil,t}) &\equiv \text{stock price sensitivity to oil price changes from time t} \\ &\quad \text{to t + 1} \\ &= (p_{oil,t} \times \text{oil reserve quantity}_t)/MVE_t \\ &\quad + (p_{oil,t} \times \text{oil notional quantity-short}_t)/MVE_t. \end{aligned} \quad (7)$$

It should be noted that although equation (7) is based on fair value of reserves (through equation [2]) and fair value of derivatives (through equation [4]), such fair values do not directly enter the model in equation (7).

In equation (7), stock price sensitivity at a point in time is defined to be a clear function of the value of its long position and the notional value of its short oil position. So for a firm, price sensitivities will vary across time if the value of its long and short positions change over time. The same intuition can be extended to a cross-sectional setting where firms with larger long positions and smaller short positions can be expected to have higher stock price sensitivities to oil prices. However, developing the specific equation to be estimated is complicated by the institutional features of the O&G industry and by such design issues as the frequency with which disclosure proxies are available, the time interval over which stock price sensitivity to oil prices can be estimated, and the desire to increase econometric efficiency in estimation. Hence, I develop the ideas behind the model actually tested (equation [11]) using a series of intermediate equations (8), (9) and (10) described in the following paragraphs.

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[6] $\Delta FV_{oil,u}$ may be relatively insensitive to Δp_{oil} if the oil price level is close to or below the extraction cost. However, this is unlikely to be a major concern during my sample period, 1993 to 1996, because the average price per barrel of oil was $19.52, whereas the average industry-wide extraction cost per equivalent barrel of oil was $4.77 (Standard and Poor's Industry Survey 1997). Thus, during this period, typical oil and gas prices were far enough above typical extraction costs that change in reserve values would be linearly related to oil and gas price changes.

[7] Equation (5) is based on the premise that firms in the sample typically hold futures, forwards or swaps to assume short positions in oil. Evidence consistent with this premise is provided in section 4 (panel B of table 2). If options were more commonly used by firms to assume short positions in oil, Δp_{oil} and consequently $\Delta FV_{oil,d}$ may be zero at oil price levels below the floor oil price set by the option contract.

Equation (8) converts the relation derived in equation (7) into a cross-sectional regression equation for j firms across y years. Equation (8) suggests that firm j's stock price sensitivity to oil price changes measured over a year y ($\beta_{oil,j,y}$) is explained by two factors underlying such sensitivity, i.e., the product of current oil prices and reserve quantities (value of proven oil reserves) held by firm j during year y and the product of current oil prices and derivative quantities (the notional value of oil derivatives-short) held by firm j during the year y:

$$\beta_{oil,j,y} = \delta_0 + \delta_r\,(\text{value of proven oil reserves}_{j,y}/\text{MVE}_{j,y}) \\ + \delta_d\,(\text{notional value of oil derivatives-short}_{j,y}/\text{MVE}_{j,y}) + \varepsilon_{j,y}. \qquad (8)$$

Relaxing the assumption that firms have no gas reserves, an expression similar to equation (8) can be derived for firms' stock price sensitivity to gas price changes measured over year y ($\beta_{gas,j,y}$):[8]

$$\beta_{gas,j,y} = \lambda_0 + \lambda_r\,(\text{value of proven gas reserves}_{j,y}/\text{MVE}_{j,y}) \\ + \lambda_d\,(\text{notional value of gas derivatives-short}_{j,y}/\text{MVE}_{j,y}) + \varepsilon_{j,y}. \qquad (9)$$

Coefficients $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$ are predicted to be positive because O&G firms in my sample do not hedge all their oil and gas reserves (see table 2 panel A, for evidence). Turning to variables that explain $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$ in equations (8) and (9), theory predicts that coefficients δ_r and λ_r on proven oil and gas reserves should be 1 whereas coefficients δ_d and λ_d on the notional value of oil and gas derivatives-short should be -1. Intercepts δ_0 and λ_0 should be zero if firms' stock price sensitivity to oil and gas price changes is explained fully by the firms' reserves and their derivative positions.

However, predictions about the magnitude of the stated coefficients are unlikely to hold when equations (8) and (9) are applied to the data. In particular, the intercepts δ_0 and λ_0 are not expected to be zero because factors other than reserves and derivative positions may influence $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$. For example, $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$ would vary cross-sectionally and inter-temporally as a function of different tax rates faced by firms (Clinch and Magliolo 1992). However, disclosures of proven reserves and derivative positions may not incorporate the effects of different tax structures across firms and across time for a given firm. Further, revisions in firms' competitive positions caused by oil and gas price-induced changes in future production and marketing strategies may vary cross-sectionally across firms and across time for a given firm (see Stulz and Williamson 1997). Although such revisions in competitive exposures would be embedded in stock market determined $\beta_{oil,j,y}$s and $\beta_{gas,j,y}$s, they may not be captured by my measures of firms' reserves and derivative positions.

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[8] I effectively assume that oil price changes are not highly correlated with gas price changes. As an empirical matter the correlation between oil and gas returns is significant but small (0.07; $p = 0.01$).

For similar reasons, I expect coefficients δ_r and λ_r on reserve values to be positive (not exactly 1) and coefficients δ_d and λ_d on derivative notional values to be negative (not exactly -1). Three sources of measurement error constrain me to predict merely the signs and not the magnitudes of the coefficients on proven reserves and derivative positions. First, a predicted value of 1 for δ_r and λ_r relies on the descriptive validity of the Hotelling valuation principle. However, prior work has documented only mixed empirical evidence in support of the principle (see Alciatore 1990; Miller and Upton 1985a, 1985b; Clinch and Magliolo 1992). Second, I have to allow $\beta_{oil,j,y}$s and $\beta_{gas,j,y}$s to change only once a year when a firm reports annual measures of its proven reserves and derivative short positions although the theory developed in equation (7) imposes no such restriction. Third, as explained more fully below, $\beta_{oil,j,y}$s and $\beta_{gas,j,y}$s need to be estimated because they are not directly observable. A firm's $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$ can be measured as the sensitivity of firms' stock returns to percentage changes in prices of a benchmark crude oil or natural gas. However, the changes in the price of the benchmark crude oil or natural gas may be a noisy proxy for the actual price changes experienced by each firm because a firm may have reserves and derivatives for many different grades and types of oil and gas. Therefore, I expect a positive statistically significant δ_r and λ_r and a negative statistically significant δ_d and λ_d if tabular disclosures of oil reserves and short-derivative positions are correlated with the information investors use in setting security prices.

The dependent variables $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$ in equations (8) and (9) are not observable to the researcher but need to be empirically estimated. Oil and gas betas can be estimated by regressing the return for a firm j over m months (R_{jm}) in year y against three factors for year y: the holding period return on the market over m months ($MKTRET_m$), percentage changes in spot prices of a benchmark crude oil over m months ($\Delta OPRICE\%_m$), and the percentage change in the spot prices of a benchmark natural gas over m months ($\Delta GPRICE\%_m$).[9] Although using daily return data instead of monthly return data has the advantage of higher frequency of observations to measure $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$, daily return data can introduce substantial asynchronous trading biases in the reported $\beta_{oil,y}$ and $\beta_{gas,y}$ measures, especially for infrequently traded stocks. Because a few O&G firms in the sample trade infrequently, with some not trading every day, I use monthly returns to calculate $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$. The model, fitted for each firm j and year y, yields a series of firm j- and year y-specific estimates of market price reactions to changes in oil and prices over the year y:

$$R_{j,m} = \alpha_j + \beta_{mkt,j,y}\, MKTRET_m + \beta_{oil,j,y}\, \Delta OPRICE\%_m + \beta_{gas,j,y}\, \Delta GPRICE\%_m + \varepsilon_{j,m}. \quad (10)$$

Note that if equation (8) and equation (9) were estimated separately from equation (10), I would give the same weight to each estimated oil and gas beta regardless of its standard error. To address this inefficiency, I jointly estimate oil and gas betas along with the determinants of the betas in one specification. In particular, I combine the expressions in equations (8) and (9) for oil and gas betas with equation (10) and estimate the parameters in the following empirical specification where the time subscript on returns is now m to denote monthly returns and the time subscript on disclosure proxies is y to denote yearly measure of the variable. All reserve and derivative variables are scaled by market value of the firm at the beginning of the year. Thus, equation (11) is estimated using a total of m × j firm-months in the sample:[10]

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[9] The benchmark crude oil is a grade of oil known as "West Texas Intermediate" while the benchmark natural gas is known as "Henry Hub."

$$\begin{aligned} R_{j,m} = {} & \gamma_0 + \gamma_1 \mathrm{MKTRET}_m + \gamma_2 \Delta \mathrm{OPRICE\%}_m + \gamma_3 \Delta \mathrm{GPRICE\%}_m \\ & + \gamma_4(\Delta \mathrm{OPRICE\%}_m \times \text{value of proven oil reserves}_{j,y}/\mathrm{MVE}_{j,y-1}) \\ & + \gamma_5(\Delta \mathrm{OPRICE\%}_m \times \text{notional value of oil derivative-short}_{j,y}/\mathrm{MVE}_{j,y-1}) \\ & + \gamma_6(\Delta \mathrm{GPRICE\%}_m \times \text{value of proven gas reserves}_{j,y}/\mathrm{MVE}_{j,y-1}) \\ & + \gamma_7(\Delta \mathrm{GPRICE\%}_m \times \text{notional value of gas derivative-short}_{j,y}/\mathrm{MVE}_{j,y-1}) \\ & + \varepsilon_{j,m}. \end{aligned} \tag{11}$$

Equation (11) is the empirical specification used to test the risk-relevance of tabular disclosures. The coefficients on the oil and gas return interaction terms in equation (11) γ_4, γ_5, γ_6 and γ_7 are analogous to δ_r, δ_d, λ_r and λ_d in equations (8) and (9). Therefore, I expect γ_4 and γ_6 to be positive and γ_5 and γ_7 to be negative if tabular disclosures of oil reserves and short-derivative positions are correlated with the information investors use in setting security prices. As discussed earlier, intercepts δ_0 from equation (8) and λ_0 from equation (9) are unlikely to be zero. Such nonzero intercepts from equations (8) and (9) would manifest themselves as nonzero γ_2 and γ_3 coefficients in equation (11). The oil and gas price interaction terms are scaled by market value of the firm at the beginning of the year. In equation (11), the value of proven oil reserves is measured as the product of SFAS No. 69 proven oil and gas reserve quantity and year-end spot oil and gas prices.[11] The notional value of oil and gas derivatives-short is measured as product of the quantity of oil and gas sold short and the weighted average price at which such oil and gas is sold short, both reported by firms at year-end per SFAS No. 119. Exhibits 2 and 3 illustrate how SFAS No. 69 and SFAS No. 119 disclosures are used to represent the constructs "value of proven oil or gas reserves" and "notional values of oil or gas derivatives-short" for a typical sample firm, Newfield Exploration Company.

III. SENSITIVITY ANALYSIS DISCLOSURES

Tabular disclosures do not directly state the potential loss resulting from commodity price risk. Investors have to infer potential loss using information provided about contract terms and cash flows of derivative commodity instruments and underlying oil and gas reserves. In contrast, the sensitivity analysis approach requires explicit estimates of the potential loss in future earnings, future cash flows or fair values that arise from derivative commodity instruments and encourages voluntary reporting of losses that arise from underlying commodity positions. O&G firms ordinarily do not make explicit disclosures of the potential losses arising from the sensitivity of their oil and gas reserves to price risk.

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[10] This methodology is similar to that used in previous research (Tufano 1998; Collins and Venkatachalam 1997; Schrand 1997; Wong 1997; Pillof 1994; Nabar 1995) to document associations between accounting disclosures and a stock-market-based measure of net market risk exposure. The qualitative findings when the empirical specifications were reestimated using the portfolio time-series regression approach suggested by Sefcik and Thompson (1986) are similar to those reported in the paper. The tenor of inferences from the empirical specifications is unchanged when (1) weekly returns are used instead of monthly returns; (2) $\Delta\mathrm{OPRICE\%}_m$ and $\Delta\mathrm{GPRICE\%}_m$ are measured as percentage changes in oil and gas futures prices instead of spot prices; (3) percentage changes in six-month London Inter Bank Offer Rate (LIBOR) is included as an additional explanatory variable to control for changes in interest rates; and (4) the interaction of $\Delta\mathrm{OPRICE\%}_m$ and $\Delta\mathrm{GPRICE\%}_m$ with the reserve and derivative variables is scaled by market value of equity at year-end instead of market value of equity at the beginning of the year.

[11] The tenor of results is unchanged when average spot oil price is used in place of year-end spot oil price.

In the following subsection, I derive the predicted relation between a firm's oil and gas price sensitivity and the fair value changes in reserves and derivative positions. I also discuss the limitations of data adapted from SFAS No. 69 and SFAS No. 119 to measure the change in fair value of reserves and derivative positions and the impact of those limitations on the empirical model tested.

EXHIBIT 2
An Illustration of SFAS No. 69 Disclosures Drawn from the 1995 10-K of Newfield Exploration Company

SUPPLEMENTARY FINANCIAL INFORMATION
SUPPLEMENTARY OIL AND GAS DISCLOSURES-UNAUDITED
(paragraphs omitted)

Proved developed and undeveloped reserves	*Oil, Condensate and Natural Gas Liquids (MBbls)*	*Natural Gas (MMcf)*
December 31, 1994	8,610	153,967
Reserve changes during the year (details suppressed)	1,023	49,613
December 31, 1995	9,633	203,580

Notes:

For the year ended December 31, 1995:

1. Value of proven oil reserves for 9.633 million barrels at $19.55 per barrel (WTI spot price as of December 29, 1995, last trading day of 1995) is $188.32 million.
2. Value of proven gas reserves of 203,580 million cubic feet at $3.606 per thousand cubic feet (Henry Hub spot price as of December 29, 1995) is $734.1 million.
3. Quantity of oil (gas) proven reserve changes for 1995 is 1.023 million barrels (49,613 million cubic feet).

(paragraphs omitted)

A summary of the changes in standardized measure of discounted future net cash flows applicable to proved oil and gas reserves is as follows (in thousands):

	Year ended December 31, 1995
Beginning of the period	$180,002
Revisions of previous estimates:	
Changes in prices and costs (SFAS No. 69 price revisions)	61,917
Other reasons for the change (suppressed here)	34,407
End of period	$276,326

An Empirical Relation Between Fair Value Sensitivity Information and a Market-Based Measure of Risk Exposure

As before, consider an O&G firm with no gas reserves. The change in the market value of such a firm from time t to t + 1 (ΔMVE) can be expressed as a change in the fair value of underlying oil reserves ($\Delta FV_{oil,u}$) and change in the fair value of oil derivative positions ($\Delta FV_{oil,d}$):

$$\Delta MVE = \Delta FV_{oil,u} + \Delta FV_{oil,d}. \tag{12}$$

Multiplying and dividing equation (12) by $p_{oil,t}/(MVE_t \times \Delta p_{oil})$ yields:

$$\begin{aligned}(\Delta MVE/MVE_t)/(\Delta p_{oil}/p_{oil,t}) &= \text{stock price sensitivity to oil price changes} \\ &\quad \text{from time t to time t + 1} \\ &= (\Delta FV_{oil,u}/MVE_t)/(\Delta p_{oil}/p_{oil,t}) \\ &\quad + (\Delta FV_{oil,d}/MVE_t)/(\Delta p_{oil}/p_{oil,t}).\end{aligned} \tag{13}$$

EXHIBIT 3

An Illustration of Commodity Derivatives Disclosures Drawn from the 1995 10-K of Newfield Exploration Company

1. Financial Instruments with Off-Balance-Sheet Risk

From time to time, the Company has utilized hedging transactions with respect to a portion of its oil and gas production to achieve a more predictable cash flow, as well as to reduce its exposure to price fluctuations.

(paragraphs omitted)

The following is a summary of the Company's gas swap positions as of December 31, 1995 and 1994.

	MMMBtu	*Period*	*Weighted Average Price (MMBtu)*	*Weighted Average Price (Mcf)*	*Fair Value Market*
December 31, 1995	15,000	January 1996–September 1996	\$1.72	\$1.83	(\$7.2 million)
December 31, 1994	11,150	January 1995–September 1995	\$1.72	\$1.84	\$1.9 million

Oil. The Company has entered into sales contracts for approximately 421 barrels of oil production per day for the perod January 1996 through April 1996, which effectively fixed the Louisiana Light Sweet ("LLS") posted price for such production at \$16.50 per barrel. Additionally, the Company has entered into a crude oil swap agreement for 1,000 barrels of oil production per day for the period January 1996 through June 1996, which effectively fixed the LLS posted price for such production at \$15.25 per barrel.

Because substantially all of the Company's oil production is under spot contracts that reference to the LLS posted price, the Company has no basis risk with respect to these transactions.

The fair value of the crude oil swap agreement was a loss of approximately \$0.4 million as of December 31, 1995.

(*Continued on next page*)

EXHIBIT 3 (Continued)

The opportunity loss will be substantially offset in the cash market when the hedged commodity is delivered in 1996, which has the effect of fixing the price at which the commodity is sold. The Company did not have any crude oil swaps in place at December 31, 1994.

2. *Management's discussion and analysis of hedging activities for the year ended December 31, 1995.*

(paragraphs omitted)

As a result of hedging activities for 1995, the Company realized a $2.7 million increase in revenues.

Notes: The empirical variables used to measure various aspects of derivatives' activity in equations (11), (17) and (18) are computed as follows:

1. Notional value of oil derivatives-short is the sum of	
Oil swaps: 182,000 barrels at $15.25 per barrel	$2.77 million
LLS contracts: 50,941 barrels at $16.50 per barrel	$0.84 million
	$3.61 million
2. Notional value of gas derivatives-short is measured as 15,000 trillion btu at $1.72 per million btu	$25.8 million
3. Fair value of traded derivatives is computed as	
Fair value of traded derivatives as of 12/31/1995	$(7.2) million
Less: Fair value of traded derivatives as of 12/31/1994	$1.9 million
Add (less): Realized gains (losses) on derivatives in 1995	$2.7 million
	$(6.4) million
4. OTC oil derivatives-short is the 50,941 barrels on the LLS contracts.	

In equation (13), stock price sensitivity at a point in time is defined to be a function of the fair value change of the firm's long position in underlying reserves and the fair value change of the firm's short position in derivatives. So for a firm, price sensitivities will vary across time if the fair value changes of its long and short positions change over time. The same intuition can be extended to a cross-sectional setting where firms with larger fair value changes in underlying reserves and smaller fair value changes in derivative positions can be expected to be associated with higher stock price sensitivities to oil prices. In the following paragraphs, I develop the ideas behind the model actually tested (equation [17]) using intermediate equations (14), (15) and (16).

Equation (14) below converts the relation derived in equation (13) into a cross-sectional regression equation for j firms across y years. Equation (14) suggests that $\beta_{oil,j,y}$, firm j's stock price sensitivity to monthly percentage in oil prices changes ($\Delta OPRICE\%_m$) over year y, is explained by fair value changes in underlying reserves and fair value changes in short-derivative positions for firm j during the year y:

$$\beta_{oil,j,y} = \eta_0 + \eta_r[(\Delta FV_{oil,u,j,y}/MVE_y)/\Delta OPRICE\%_m] + \eta_d[(\Delta FV_{oil,d,j,y}/MVE_y)/\Delta OPRICE\%_m] + \varepsilon_{j,y}. \qquad (14)$$

Relaxing the assumption that firms have no gas reserves, an expression similar to equation (14) can be derived to explain firms' stock price sensitivity to gas price changes measured over year y ($\beta_{gas,j,y}$) in terms of fair value change in underlying gas reserves ($\Delta FV_{gas,u}$) and fair value change in gas derivative positions ($\Delta FV_{gas,d}$):

$$\beta_{gas,j,y} = \omega_0 + \omega_r[(\Delta FV_{gas,u,j,y}/MVE_y)/\Delta GPRICE\%_m] + \omega_d[(\Delta FV_{gas,d,j,y}/MVE_y)/\Delta GPRICE\%_m] + \varepsilon_{j,y}. \quad (15)$$

As before, $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$ are predicted to be positive because O&G firms in the sample hold net long positions in oil and gas. I expect the intercept terms η_0 in equation (14) and ω_0 in equation (15) to be nonzero because my accounting measures of fair value changes on reserves and derivatives are unlikely to capture fully cross-sectional and intertemporal differences in tax rates and competitive exposures. I merely predict the signs, not the magnitude, of coefficients related to the explanatory variables in equations (14) and (15) because of: (1) shortcomings in my fair value measures (explained more fully later); (2) the measurement error resulting from using price changes in a benchmark crude and natural gas to proxy for a firm's actual oil and gas prices; and (3) the need to allow $\beta_{oil,j,y}$ and $\beta_{gas,j,y}$ to vary only once a year in response to annually disclosed fair value information.

Turning to equations (14) and (15), I expect coefficients η_r and ω_r on the oil and gas price-induced fair value changes in reserves to be positive. Firms with greater fair value *gains* in reserves per unit of an *increase* in oil prices and gas prices would have higher β_{oil} and β_{gas}, respectively. Similarly, if oil prices decrease, firms with greater fair value *losses* in reserves per unit of a *decrease* in oil prices would have greater β_{oil} and β_{gas} coefficients, respectively.

Coefficients η_d and ω_d on the oil and gas price induced fair value changes in short derivative positions are expected to be negative. Notice that the directional predictions on η_d and ω_d are opposite the previously discussed predictions on η_r and ω_r. This is because the fair value changes of derivatives would be negatively associated with fair value changes of oil and gas reserves given that sample firms hedge less than 100 percent of their underlying reserves.[12] To illustrate this negative association, assume that the current oil price is equal to the strike price of a futures contract sold by the firm. An *increase* in oil prices would result in fair value *losses* on the firm's futures contract as against fair value *gains* in underlying reserves. Similarly, a *decrease* in oil prices would result in fair value *gains* on the firm's futures contract as against fair value *losses* in underlying reserves.

It is noteworthy that equations (14) and (15) can be applied to a pooled data set containing periods of increasing and/or decreasing oil and gas prices. The ability to pool data over different price environments is important because my sample period 1993 to 1996 is characterized by both increases and decreases in oil and gas prices (see figure 1). Pooling across different price environments is possible because the ratio of fair value changes in oil and gas reserves (derivatives) scaled by percentage changes in oil and gas prices is expected to be positive (negative) irrespective of the direction of the oil and gas price change.

As before, equations (14) and (15) can be combined into the three-factor model described in equation (10). The resulting equation (16) can be estimated using monthly returns:

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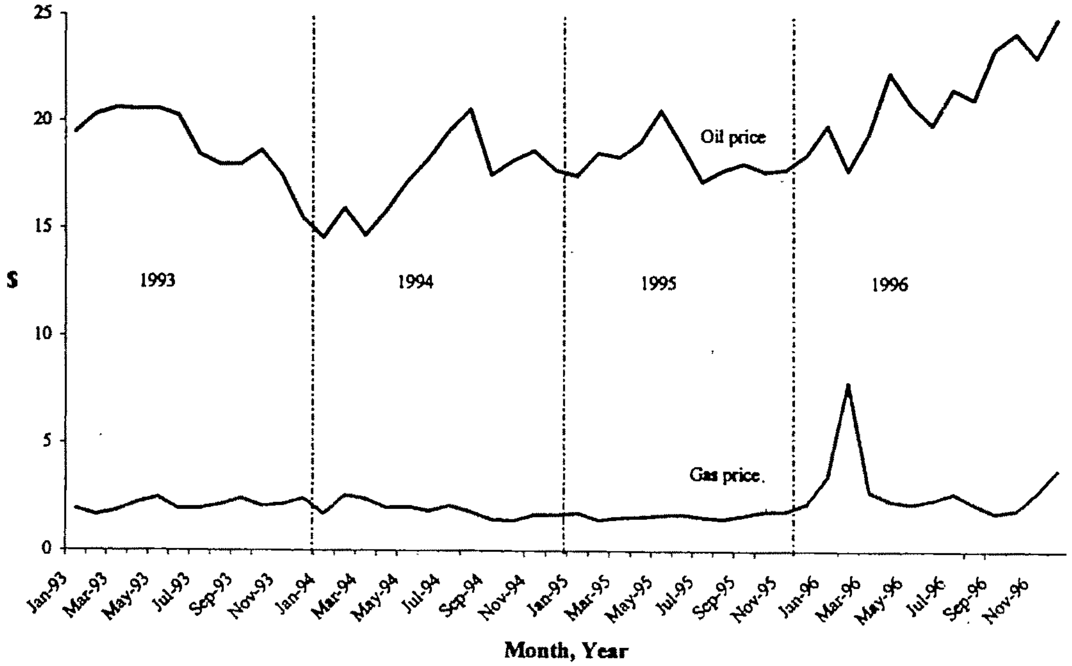
[12] The correlation between SFAS No. 69 price revisions (my measure of fair value gains and losses on underlying reserves) and fair value changes in traded derivatives (my measure of fair value gains and losses on derivatives) is a negative 0.13 ($p = 0.01$ for a one-tailed test).

FIGURE 1
Oil and Gas Price Behavior Over the Sample Period (1993–1996)



Oil price is the spot price per barrel of the West Texas Intermediate grade of crude oil. Gas price is the spot price per million British thermal units of the Henry Hub grade of natural gas. All prices are as of the first trading day of the month.

$$
\begin{aligned}
R_{j,m} = {} & \lambda_0 + \lambda_1 MKTRET_m + \lambda_2 \Delta OPRICE\%_m + \lambda_3 \Delta GPRICE\%_m \\
& + \eta_r\,(\Delta FV_{u,oil,j,y}/MVE_y) + \eta_d(\Delta FV_{d,oil,j,y}/MVE_y) \\
& + \omega_r\,(\Delta FV_{u,gas,j,y}/MVE_y) + \omega_d\,(\Delta FV_{d,gas,j,y}/MVE_y) + \varepsilon_{j,m}. \qquad (16)
\end{aligned}
$$

Recall that coefficients η_r and ω_r are expected to be positive whereas coefficients η_d and ω_d are predicted to be negative. Further, the nonzero intercept η_0 from equation (14) and ω_0 from equation (15) would be reflected in nonzero coefficients λ_2 and λ_3 in equation (16).

I use change in the net present values of oil and gas reserves due to change on oil and gas prices reported per SFAS No. 69 (hereafter, SFAS No. 69 price revision disclosures) to measure $\Delta FV_{u,oil}$ and $\Delta FV_{u,gas}$. I measure $\Delta FV_{d,oil}$ and $\Delta FV_{d,gas}$ as fair value gains and losses on derivatives for which fair value data are available (hereafter, traded derivatives), adjusted for realized gains and losses in traded derivatives during the year. Exhibits 2 and 3 provide examples of SFAS No. 69 price revisions and fair value changes of traded derivatives for a typical sample firm, Newfield Exploration Company.

Shortcomings in the data impose several limitations on the model specification. These limitations require equation (16) to be revised as follows:

$$\begin{aligned} R_{j,m} = {} & \alpha_0 + \alpha_1 \text{MKTRET}_m + \alpha_2 \Delta\text{OPRICE\%}_m + \alpha_3 \Delta\text{GPRICE\%}_m \\ & + \alpha_4(\text{SFAS No. 69 price revisions}_{j,y}/\text{MVE}_{y-1}) \\ & + \alpha_5(\text{fair value change in traded derivatives}_{j,y}/\text{MVE}_{y-1}) \\ & + \alpha_6(\Delta\text{OPRICE\%}_m \times \text{quantity of oil reserve changes}_{j,y}/\text{MVE}_{y-1}) \\ & + \alpha_7(\Delta\text{GPRICE\%}_m \times \text{quantity of gas reserve changes}_{j,y}/\text{MVE}_{y-1}) \\ & + \alpha_8(\Delta\text{OPRICE\%}_m \times \text{notional quantity of oil OTC derivatives-short}_{j,y}/\text{MVE}_{y-1}) \\ & + \alpha_9(\Delta\text{GPRICE\%}_m \times \text{notional quantity of gas OTC derivatives-short}_{j,y}/\text{MVE}_{y-1}) \\ & + \varepsilon_{j,m}. \end{aligned} \tag{17}$$

Equation (17) is the model actually used to assess the risk-relevance of the fair value price revisions based on SFAS No. 69 disclosures and fair value change in traded derivatives. The rationale behind estimating equation (17) is guided by three specific data-related constraints.

First, SFAS No. 69 price revisions and fair value change in traded derivatives cannot be readily decomposed into fair value changes pertaining to the oil component and gas component. Therefore, coefficient α_4 in equation (17) represents the joint impact of fair value changes in both oil and gas reserves on oil and gas price sensitivity. Coefficient α_4 is predicted to be positive because η_r on $\Delta FV_{u,oil,j,y}$ and ω_r on $\Delta FV_{u,gas,j,y}$ are each predicted to be positive in equation (16). Similarly, coefficient α_5 in equation (17) represents the joint impact of fair value changes in both oil and gas traded derivatives and is expected to be negative because η_d on $\Delta FV_{d,oil,j,y}$ and ω_d on $\Delta FV_{d,gas,j,y}$ are each predicted to be negative in equation (16). In sum, I expect coefficient α_4 (α_5) to be positive (negative) if SFAS No. 69 price revisions (fair value change in traded derivatives)—proxies for sensitivity analysis disclosures—are associated with the information set that the market uses to set oil and gas price sensitivity.

Second, SFAS No. 69 price revision disclosures measure change in oil and gas prices between the last day of the current and previous fiscal year as applied to the *previous year-end's* reserve quantities (SFAS No. 69, para. 33). A complete estimate of the fair value sensitivity of underlying exposure to price changes would incorporate the contribution of the current year's net reserve additions to such sensitivity. Although data to quantify such contribution are not readily available, I include two variables in equation (17) to proxy for monthly fair value gains and losses on net reserve additions during the year: (1) the product of ΔOPRICE%$_m$ with the quantity of the year's net oil reserve additions and (2) the product of ΔGPRICE%$_m$ with the quantity of the year's net gas reserve additions. Because reserve additions increase a firm's long position in oil and gas, I expect coefficients α_5 and α_6 to be positive. It is noteworthy that the median firm adds about 11 (10) percent of its beginning of the year oil (gas) reserve stock during the sample period.

Third, O&G firms ordinarily do not report fair values of commodity derivatives that are not traded on exchanges (hereafter, OTC derivatives). Such OTC derivatives are usually long-term arrangements for time periods ranging from one to ten years and are designed either to lock in future delivery prices or to accept payments for a fixed quantity of future production. I use the product of ΔOPRICE%$_m$ (ΔGPRICE%$_m$) and the year-end notional quantity of OTC oil (gas) derivatives in equation (17) as a proxy for the monthly fair value gains and losses on OTC derivatives held by a firm. Because OTC derivatives represent short positions in oil and gas, I expect coefficients α_7 and α_8 on the proxies for fair value changes in OTC derivatives to be negative. It should be recognized that OTC derivative usage is not substantial in my sample. The median firm holds no OTC derivatives. The mean sample firm hedges about 0.68 percent (2.47 percent) of its oil (gas) reserve value through OTC derivatives. In contrast, the mean sample firm hedges about 3.86 percent (7.81 percent) of its oil (gas) reserve values using both traded and OTC derivatives.

To summarize, coefficient α_4 (α_5) is expected to be positive (negative) if proxies for sensitivity analysis measures, namely SFAS No. 69 price revisions (fair value change in traded derivatives), are relevant to the market in assessing firms' oil and gas price sensitivity. Drawing from the discussion following equation (16), I expect coefficient α_2 on $\Delta OPRICE\%_m$ and α_3 on $\Delta GPRICE\%_m$ to be nonzero. It is important to recognize that the predictions related to proxies for fair value changes in reserve additions and OTC derivatives are not the primary focus of the empirical test. These proxies are included in equation (17) to circumvent the interpretation that the observed effect of the test variables—SFAS No. 69 price revisions and fair value changes of traded derivatives—on oil and gas price sensitivity are due to the influence of fair value changes in reserve additions and OTC derivatives.

IV. SAMPLE SELECTION AND DATA

Sample

The sample period begins in 1993 because commodity derivative data are not readily available in annual reports before 1993. A sample of 246 O&G firms was initially compiled from the 1996 Compustat list of companies in SIC code 1311 (oil and gas production). Forty-one firms registered outside the United States were eliminated because the effect of differences in the economic financial reporting and stock market characteristics between foreign firms and U.S. corporations would be difficult to control in an empirical model. Eighty-one of the remaining firms do not have CRSP data available for any year during the period 1993 to 1996. Nine firms were eliminated because annual reports were not received and financial statements for these firms were not available from Lexis/Nexis or the SEC's EDGAR databases. Ten firms without December year-ends were also removed from the sample to facilitate matching the firm's equity returns with changes in oil and gas prices. Fifty-three firms that did not report using derivatives during the sample period were eliminated from the analysis because it is hard to assess whether these firms do not use oil and gas derivatives or do not disclose use of oil and gas derivatives. The final estimation of equation (11) includes 52 firms, or 149 firm-years, with available tabular format data. Data to assess sensitivity analysis disclosures, in particular the fair value gains and losses on derivatives, are available for 38 firms, or 89 firm-years, to estimate equation (17).

Descriptive Statistics: $B_{oil,j}$ and $B_{gas,j}$

Table 1 presents estimates of $\beta_{oil,j}$ and $\beta_{gas,j}$ from the three-factor model in equation (10) to describe the statistical characteristics of the oil and gas betas. To compute estimates of $\beta_{oil,j}$ and $\beta_{gas,j}$ I use monthly measures of MKTRET, ΔOPRICE% and ΔGPRICE% for each firm in my sample of 52 O&G firms over the sample period 1993 to 1996. Stock returns for each firm j ($R_{j,m}$) and the holding period return on the S&P 500 index (MKTRET) are obtained from CRSP. Spot price data for "West Texas Intermediate" grade of crude oil and the "Henry Hub" grade of natural gas to measure ΔOPRICE% and ΔGPRICE% are obtained from the Bloomberg Financial Markets database.

On average, a 1 percent increase in oil prices (gas prices) leads to approximately a 0.30 percent (0.06 percent) increase in the stock return of the median firm. As expected, most of the firms in the sample (79.86 percent for oil and 68.67 percent for gas) have

TABLE 1
Descriptive Statistics for O&G Oil and Gas Betas

The table summarizes the mean, median, standard deviation, minimum and maximum of the coefficient estimates and adjusted R^2 from three-factor market model regressions in equation (10) for 52 O&G firms with complete monthly market data for the calendar years 1993–1996. Although equation (10) is not used to test the risk-relevance of disclosures, results of estimating (10) are presented to describe the statistical properties of oil and gas betas. Unlike the theory developed in sections II and III, oil and gas betas in the table are assumed to be stationary over the entire sample period. The oil price factor is the percentage change in the prices of a benchmark crude oil known as "West Texas Intermediate." The gas price factor is the percentage change in the prices of a benchmark natural gas known as "Henry Hub." The market return factor is the monthly holding period return for the Standard and Poor's (S&P) 500 portfolio.

Summary of equation (10) by firm: $R_{j,m} = \alpha_j + \beta_{mkt,j}\, MKTRET_m + \beta_{oil,j}\, \Delta OPRICE\%_m + \beta_{gas,j} \Delta GPRICE\%_m + \nu_{j,m}$

	β_{mkt}	β_{oil}	β_{gas}	*Adj. R^2*
Mean	0.809	0.247	0.072	12.52%
Median	0.915	0.300	0.061	11.36%
Standard Deviation	0.709	0.337	0.112	9.04%
Minimum	−0.791	−0.682	−0.194	0.00%
Maximum	2.741	1.124	0.314	39.46%
% > 0	90.60%	79.86%	68.67%	
% > 0 and significant at $p < 0.05$	46.58%	38.42%	36.78%	
% < 0 and significant at $p < 0.05$	0.00%	1.92%	0.00%	

Statistical significance is assessed for a one-sided hypothesis.

$R_{j,m}$ = Holding period return for firm j over month m;
$MKTRET_m$ = Holding period return for S&P 500 portfolio over month m;
$\Delta OPRICE\%_m$ = Percentage change in prices of "West Texas Intermediate" crude oil over month m;
$\Delta GPRICE\%_m$ = Percentage change in prices of "Henry Hub" natural gas over month m.

positive oil and gas betas, consistent with the fact that most sample firms hold net long positions in oil and gas. Of the 52 firms in the sample, 38.42 percent (36.78 percent) have positive and statistically significant oil (gas) betas at the 5 percent level of significance for a one-tailed test. In comparison, 46.58 percent of the market betas are positive and statistically significant (at the 5 percent level for a one-tailed test).

It is important to remember that the oil and gas betas reported in table 1 contain measurement error because they are averages over the 1993–1996 period, whereas the theory underlying the empirical specifications in equations (11) and (17) suggests that oil and gas price sensitivities depend on firm-specific and time-period-specific stock of underlying reserves and the derivative strategy. The tests of equations (11) and (17) that follow in section V assume that the measures of firm-specific and period-specific sensitivities have enough systematic information content that they are not completely dominated by measurement error. The presence of significant firm-specific sensitivities displayed in table 1 provides some evidence that the assumption is reasonable within the sample. In particular, the number of significant oil and gas sensitivities are quite large when viewed from the perspective of the number of market betas that are significantly positive. However, a failure to document a relation between the examined disclosures and oil and gas price sensitivities could be the result of measurement error in the O&G price sensitivities rather than the irrelevance of the disclosures.

Independent Variables: Descriptive Statistics and Analyses

Panel A of table 2 provides descriptive data on the characteristics of underlying exposure, measured as value of proven reserves and derivative commodity instruments, measured as notional values of short positions in oil and gas for the entire sample of 149 firm-years. The mean (median) firm hedges 3.86 percent (1.29 percent) of its oil reserves and 7.81 percent (4.09 percent) of its gas reserves. The percentage of reserves hedged shows significant cross-sectional variation with a standard deviation of 6.71 percent for oil and 10.19 percent for gas. The maximum percentage of reserves hedged is 52 percent for oil and 54.9 percent for gas. Thus, no firm hedges more than 100 percent of its reserves, implying that firms have a net long position in oil and gas price risk. This finding is consistent with the earlier evidence that 38.42 percent (36.78 percent) of firms have significantly positive oil (gas) betas while only 1.2 percent (0 percent) of the firms have significantly negative oil (gas) betas. The relatively small percentages of hedging activity observed in panel A of table 3 suggest firms possibly hedge near-term, say next year's production. However, 63 percent of the firm-years in the sample held derivatives whose duration exceeded one year (results not tabulated). Hence, a majority of the firms appear to hedge future production scheduled beyond one year, providing some support for measuring underlying exposure in terms of proven reserves rather than next year's production.[13]

Panel B of table 2 presents statistics on the type of derivative instrument that firms use to assume short positions in oil and gas. Forward contracts are the most common derivative instrument used to assume short positions in oil and gas; 50 (69) firm years have oil (gas) forwards outstanding with median oil (gas) hedge ratios of 5.86 percent (4.97 percent). The use of options is relatively uncommon with 3 (8) firm-years reporting median oil (gas) hedge ratio of negative 0.08 percent (0.98 percent).[14] This is important because the association between the oil or gas beta and the notional value of commodity derivatives would be biased toward zero if options were the most commonly used instrument to assume short positions in oil and gas.

Panel C of table 2 presents descriptive statistics of SFAS No. 69 price revisions and traded derivative fair value gains and losses, expressed as a percentage of lagged market value, for a subsample of 89 firm-years where fair value gains and losses of traded derivatives were reported in the financial statements. The mean (median) firm reported a fair value gain in reserves equal to 26.89 percent (11.87 percent) of its lagged market value. A small portion of such fair value *gain* in underlying exposure of the mean (median) firm was offset with a 0.23 percent (0.06 percent) fair value *loss* in traded derivatives.

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[13] Even if we assume for the sake of argument that firms hedged only next-year's production, the fair values of proven reserves to be produced in the future are still exposed to current oil and gas price fluctuations. In fact, Clinch and Magliolo (1992) demonstrate that oil production as far down as three years from now is positively associated with current year's oil price sensitivities. Such association provides another motivation to measure underlying exposure in terms of proven reserves.

[14] An option that represents the sale of future production at some floor price was coded as a short position. Collars representing a short oil or gas position at some floor price and a long oil or gas position at some ceiling price were coded separately as a short and a long position. The median hedge ratio of −0.08 percent corresponding to oil options represents the net long leg of an oil collar.

TABLE 2
Descriptive Statistics of Independent Variables

Panel A: Underlying Exposure and Commodity Derivatives

Variable	*1st Quartile*	*Median*	*3rd Quartile*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Value of proven oil reserves/MVE$_{y-1}$	0.90	1.88	4.25	3.19	3.66	0.03	31.07
Notional value of oil-short/MVE$_{y-1}$	0.00	0.02	0.12	0.13	0.34	0	3.43
Value of proven gas reserves/MVE$_{y-1}$	1.41	2.11	3.31	3.40	4.28	0.37	53.05
Notional value of gas-short/MVE$_{y-1}$	0.02	0.08	0.26	0.36	0.98	0	9.74
Notional value of oil-short/Value of proven oil reserves (%)	0.50	1.29	5.66	3.86	6.71	0	52.35
Notional value of gas-short/Value of proven gas reserves (%)	1.17	4.09	10.43	7.81	10.19	0	54.92
Value of proven gas reserves/Value of total proven reserves (%)	39.79	56.19	70.14	54.30	22.47	8.2E–4	97.58
MVE (in $ million)	62.65	172.34	691.02	580.26	966.51	5.31	5495.00

Statistics are reported for the sample of 149 firm-year observations used to evaluate the tabular disclosures. Value of proven oil (gas) reserves is measured as the quantity of proven oil (gas) reserves at year-end reported per SFAS No. 69 multiplied by the year-end spot oil (gas) price. Notional value of oil (gas)-short refers to the quantity of oil (gas) hedged times the weighted average price at which the oil (gas) is sold forward. MVE$_{y-1}$ refers to market value of equity at the beginning of the year y.

Panel B: Firm years reporting notional value of oil (gas) derivatives-short outstanding at year end as a percentage of the value of oil (gas) reserves classified by instrument. Only nonzero observations, indicated as n ≠ 0, are included.

Derivative	*N ≠ 0*	*1st Quartile*	*Mean*	*Median*	*3rd Quartile*	*Min.*	*Max.*
Oil futures	6	1.18	3.72	2.07	4.61	0.38	10.37
Gas futures	17	0.36	4.69	0.81	8.86	0.11	14.13
Oil forwards	50	2.41	7.73	5.86	10.26	0.67	47.03
Gas forwards	69	2.75	8.20	4.97	10.49	0.05	33.59
Oil swaps	14	1.47	3.74	3.46	3.93	0.12	10.61
Gas swaps	48	1.32	6.91	4.03	7.63	0.10	41.10
Oil options	3	−2.95	−1.54	−0.08	0.61	−5.83	1.30
Gas options	8	0.52	1.10	0.98	1.51	0.08	2.53

(Continued on next page)

TABLE 2 (Continued)

Panel C. Fair value gains and losses on reserves and traded derivatives (% of lagged market value of equity).

Variable	*1st Quartile*	*Median*	*3rd Quartile*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
SFAS No. 69 price revisions (%)	−11.69	11.87	47.10	26.89	74.37	−75.42	275.67
Fair value change in traded derivatives (%)	−1.90	−0.06	1.28	−0.23	10.91	−11.08	8.39

Statistics are reported for the sample of 89 firm-year observations used to evaluate the sensitivity analysis disclosures. These 89 firm-year observations disclose fair value change in traded derivatives (derivatives whose fair values are reported in financial statements) during the years 1993–1996. SFAS No. 69 price revisions refer to oil and gas price-induced change in SFAS No. 69 reserve present values for a year. Fair value change in traded derivatives refers to the difference in fair values of traded oil and gas derivatives between the last and first day of a year adjusted for realized gains and losses in traded derivatives during the year.

V. RESULTS

Tabular Format

Column A of table 3 presents the results from estimating equation (11) using pooled observations across all periods. The coefficients on $\Delta OPRICE\%_m$ and $\Delta GPRICE\%_m$ indicate that for every percentage point change in oil and gas prices during a month, the monthly returns of sample firms change by 0.29 percent and 0.05 percent, respectively. The significant coefficients on $\Delta OPRICE\%_m$ and $\Delta GPRICE\%_m$ suggest a strong firm-specific and time-invariant relation between changes in oil and gas prices and firm-specific returns, even after controlling for variation in underlying reserves and derivative positions on oil and gas price sensitivities. Such coefficients may reflect, among other things, the omitted effects of cross-sectional and inter-temporal differences in tax rates and competitive exposures. Column A of table 3 also indicates that the notional value of oil derivatives-short (coefficient = −0.455; p-value = 0.00) and the notional value of gas derivatives-short (coefficient = −0.061; p-value = 0.02) exhibit strong negative associations with oil and gas price sensitivities, as expected. However, the associations between proven reserve values and oil and gas betas are not as strong. While the value of proven gas reserves exhibits a significant positive association with gas betas (coefficient = 0.010; p-value = 0.07), the value of proven oil reserves (coefficient = 0.021; p-value = 0.13) is not significantly different from zero. Two factors may explain the weak associations between reserve information and oil and gas betas. First, the reserve value variable is employed in the context of one simple, easily implemented, cross-sectional model in equation (11). Users might employ other or more sophisticated models in evaluating reserve quantity disclosures. To the extent that this is the case, predictions from the model in equation (11) do not necessarily hold. Second, because proven reserves are subjective geological estimates determined by firms' managers, unreliability and bias in proven reserve estimates may render the coefficients on the reserve values insignificant.

I employ a procedure used by Clinch and Magliolo (1992) to assess whether unreliability and bias in reserve estimates possibly swamp the significance of reserve quantity

TABLE 3
Estimation of Oil and Gas Price Sensitivity and Its Association with Tabular Format Measures of Net Commodity Price Risk Exposure

Equation (11):

$$\begin{aligned} R_{j,m} = {} & \gamma_0 + \gamma_1 MKTRET_m + \gamma_2 \Delta OPRICE\%_m + \gamma_3 \Delta GPRICE\%_m + \gamma_4 \Delta OPRICE\%_m \\ & \times \textit{value of proven oil reserves}_{j,y}/MVE_{j,y-1} + \gamma_5 \Delta OPRICE\%_m \\ & \times \textit{notional value of oil derivatives-short}_{j,y}/MVE_{j,y-1} + \gamma_6 \Delta GPRICE\%_m \\ & \times \textit{value of proven gas reserves}_{j,y}/MVE_{j,y-1} + \gamma_7 \Delta GPRICE\%_m \\ & \times \textit{notional value amount of gas derivatives-short}_{j,y}/MVE_{j,y-1} + \varepsilon_{j,m} \end{aligned}$$

		Underlying Exposure and Derivatives Column A		*Reliability and Bias Corrections Column B*	
Independent Variables	*Pred. Sign*	*Coeff.*	*p-value*	*Coeff.*	*p-value*
Intercept	?	−0.001	0.77	−0.000	0.80
MKTRET%	+	0.762***	0.00	0.748***	0.00
ΔOPRICE%	+	0.297***	0.00	0.261***	0.00
ΔGPRICE%	+	0.051**	0.01	0.055**	0.01
ΔOPRICE% × value of proven oil reserves	+	0.021	0.13	0.051**	0.04
ΔOPRICE% × notional value of oil derivatives-short	−	−0.455***	0.00	−0.541***	0.00
ΔGPRICE% × value of proven gas reserves	+	0.010*	0.07	0.012*	0.06
ΔGPRICE% × notional value of gas derivatives-short	−	−0.061**	0.02	−0.032**	0.05
Reliability and bias corrections					
ΔOPRICE% × value of proven oil reserves × absolute revisions dummy	−			0.011	0.59
ΔGPRICE% × value of proven gas reserves × absolute revisions dummy	−			−0.001	0.88
ΔOPRICE% × value of proven oil reserves × signed revisions dummy	−			−0.038**	0.04
ΔGPRICE% × value of proven gas reserves × signed revisions dummy	−			−0.004**	0.04
R^2		10.22%		11.31%	
F-value		29.13		18.04	

(*Continued on next page*)

TABLE 3 (Continued)

Data includes 149 firm-year observations over calendar years 1993 to 1996. The number of observations used in the regression is 1788. The t-statistics used to report p-values are calculated using White's (1980) robust standard errors.

*,**,*** indicate that coefficients are statistically different from zero at 0.10, 0.05, 0.001 level, respectively. Statistical significance is assessed for a one- (two-) tailed test when the hypothesized sign of the coefficient is predicted (not predicted). Absolute revisions dummy assumes a value of 1 (0) when the ratio of absolute reserve revisions divided by beginning proven reserve quantity for a firm over the period 1991–1996 is above (below) the median ratio for all firms in the sample. Signed revisions dummy assumes a value of 1 (0) when the ratio of signed reserve revisions divided by beginning proven reserve quantity for a firm over the period 1991–1996 is above (below) the median ratio for all firms in the sample. For other variable definitions, see tables 1 and 2.

estimates. In particular, I explore differential informativeness of reserve information by adding two interaction terms to the model. The interaction terms are the product of the reserve values in table 3 and two dummy variables. To obtain the dummy variables, I compute the variables described below using all available data for each firm in the years 1991–1996. If the variable value was above (below) the median value for the sample, the dummy was assigned a value of 1 (zero). The two dummy variables are based on average absolute revisions and average revisions, respectively.[15] To calculate average absolute revisions, I divide the absolute value of reported oil or gas revisions by the beginning proven oil or gas reserve estimate, respectively. Following Clinch and Magliolo (1992), I interpret the average absolute revisions variable as a proxy for uncertainty attached to the firm's reserve estimates. Because I expect investors to place less reliance on reserves they perceive to contain more error, I predict a negative association between this interaction variable and oil and gas betas.

The second dummy variable is calculated in the same way as the absolute revisions variable except that the signed revision disclosures are used, thereby accounting for the direction of revisions. If some firms systematically under- or overestimate disclosed reserves by reporting negative or positive revisions, investors would be expected to adjust the reported reserve estimates upward or downward. Hence, I expect a negative relation between this interaction variable and oil and gas betas.

Results of estimating the model after adding dummy variables for uncertainty and bias in reserves are reported in column B of table 3. Coefficients on value of oil reserves (0.051; p-value = 0.04) and the value of gas reserves (0.012; p-value = 0.06) are now statistically significant, as expected. The absolute revisions interaction term for both oil and gas is not statistically significant. However, the average revisions interaction is significantly negative, as expected, for both oil revisions (−0.038, p-value = 0.04) and gas revisions (−0.004, p-value = 0.04). This suggests that any systematic optimism or conservatism in reserve estimates is appropriately adjusted by the market. Moreover, the coefficient on the interaction of ΔOPRICE% and the value of oil reserves adjusted for systematic bias is 0.013 (0.051 − 0.038) and is statistically significant at p-value = 0.03 for a one-tailed test. Similarly, the coefficient on the interaction of ΔGPRICE% and the value of gas reserves adjusted for systematic bias is 0.008 (0.012 − 0.004) and is statistically significant at p-value = 0.07 for a one-tailed test. Hence, the value of oil and gas reserves is significantly associated with the oil and gas betas for the subset of firms whose reserve disclosures are perceived by the market to contain less measurement error than that of the median firm.

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[15] The findings are qualitatively similar when continuous counterparts are used instead of dummy variables. However, t-statistics on the interaction variables are somewhat reduced when using continuous ratios, possibly because of estimation error in the ability of the continuous ratio to capture uncertainty and bias in reserve estimates.

The notional value of oil and gas derivatives-short exhibits robust negative associations with oil and gas betas in all the model specifications discussed above. In sum, I find evidence that my proxy for tabular disclosures with respect to derivatives—the notional value of oil- or gas-short—is significantly associated with a market-based measure of oil and gas exposure, the oil and gas betas. However, my proxy for tabular disclosures with respect to underlying reserves is risk-relevant only when the market perceives such reserves estimates to contain less error than average.

Sensitivity Analysis Format

The results of estimating equation (18) are reported in table 4. The coefficients on $\Delta OPRICE\%_m$ (0.273, p-value = 0.00) and $\Delta GPRICE\%_m$ (0.076, p-value = 0.00) are similar in magnitude to those reported in table 4. As before, significant $\Delta OPRICE\%_m$ and $\Delta GPRICE\%_m$ coefficients suggest a strong firm-specific and time-invariant relation between changes in oil and gas prices and firm-specific returns, even after accounting for the impact of cross-sectional variation in fair value changes in underlying reserves and derivative positions on oil and gas price sensitivities. Factors such as tax rates and competitive exposures, among other things, are likely to be embedded in firms' oil and gas price sensitivities but missing from the fair value change measures considered here. As expected, the coefficient on SFAS No. 69 price revisions scaled by lagged market value is positive and significant (0.117; p-value = 0.00) while the coefficient on fair value gains and losses on traded derivatives is negative and significant (−0.085; p-value = 0.00). Thus, fair value sensitivity of reserves and commodity derivatives are strongly associated with market-based measures of oil and gas betas.

As noted in section III, SFAS No. 69 price revisions ignore the fair value gains and losses on reserve additions while fair value changes in traded derivatives do not include fair value gains and losses on OTC derivatives. Column B of table 4 shows that the significant associations reported in column A are unaffected by including proxies for these omitted variables. In general, proxies for omitted fair value effects are not statistically significant. However, the coefficient on fair value changes in gas reserve additions is positive and significant, as expected.

Thus, I find robust evidence that my fair value measures that proxy for sensitivity analysis disclosures are associated with oil and gas betas in the predicted direction. These results are inconsistent with claims made by AICPA (1998) and some commentators (see section VI (4) of SEC [1997]) that sensitivity analysis measures are too dependent on assumptions to be reflective of firms' market risk exposures.

The Incremental Information Content of the Proxies for Tabular and Sensitivity Analysis Format

The information in the tabular format disclosures is likely to be different from sensitivity analysis disclosures because users are expected to approximate a firm's market risk exposure from tabular format information while firms explicitly report estimates of their market risk exposure under the sensitivity analysis format. Because my sample includes proxies for tabular and sensitivity analysis disclosures *for the same set of firms*, I provide evidence to examine concerns, expressed notably by the U.S. Senate Subcommittee on Securities (1997), that the presence of more than one reporting option under SEC (1997) may harm investors' ability to compare one firm's risk exposures with the risk exposures of another firm. Official SEC disclosures, even when they become available, cannot be used

TABLE 4
Estimation of Oil and Gas Price Sensitivity and Its Association with Sensitivity Analysis Format Measures of Net Commodity Price Risk Exposure

Equation (17):
$$\begin{aligned}R_{j,m} = {} & \alpha_0 + \alpha_1\, MKTRET_m + \alpha_2\, \Delta OPRICE\%_m + \alpha_3\, \Delta GPRICE\%_m \\ & + \alpha_4\, (SFAS\ No.\ 69\ price\ revisions_{j,y}/MVE_{y-1}) \\ & + \alpha_5\, (fair\ value\ change\ in\ traded\ derivatives_{j,y}/MVE_{y-1}) \\ & + \alpha_6\, (\Delta OPRICE\%_m \times quantity\ of\ oil\ reserve\ changes_{j,y}/MVE_{y-1}) \\ & + \alpha_7\, (\Delta GPRICE\%_m \times quantity\ of\ gas\ reserve\ changes_{j,y}/MVE_{y-1}) \\ & + \alpha_8\, (\Delta OPRICE\%_m \times notional\ quantity\ of\ oil\ OTC \\ & \quad derivatives\text{-}short_{j,y}/MVE_{y-1}) \\ & + \alpha_9\, (\Delta GPRICE\%_m \times notional\ quantity\ of\ gas\ OTC \\ & \quad derivatives\text{-}short_{j,y}/MVE_{y-1}) \\ & + \varepsilon_{j,m}\end{aligned}$$

		Underlying Exposure and Derivatives Column A		*Underlying Exposure, Derivatives and Proxies for Omitted Variables Column B*	
Independent Variables	*Pred. Sign*	*Coeff.*	*p-value*	*Coeff.*	*p-value*
Intercept	?	−0.004	0.32	−0.004	0.36
MKTRET	+	0.723***	0.00	0.713***	0.00
ΔOPRICE%	+	0.273***	0.00	0.303***	0.00
ΔGPRICE%	+	0.076***	0.00	0.011***	0.00
SFAS No. 69 price revisions	+	0.117***	0.00	0.011***	0.00
Fair value change in traded derivatives	−	−0.085***	0.00	−0.083***	0.01
Reserve changes and OTC derivative proxies					
ΔOPRICE% × quantity of oil reserve changes	+			−0.075	0.19
ΔGPRICE% × quantity of gas reserve changes	+			0.032**	0.05
ΔOPRICE% × notional quantity of oil OTC derivatives-short.	−			0.017	0.78
ΔGPRICE% × notional quantity of OTC gas derivatives-short	−			0.014	0.38
R^2		12.99%		13.22%	
F-value		27.48		21.08	

Data includes 89 firm-year observations over calendar years 1993 to 1996. The number of observations used in the regressions is 1068. The t-statistics used to report p-values are calculated using White's (1980) robust standard errors.

*,**,*** indicate that coefficients are statistically different from zero at 0.10, 0.05, 0.001 level, respectively. Statistical significance is assessed for a one- (two-) tailed test when the hypothesized sign of the coefficient is predicted (not predicted). For variable definitions, see tables 1 and 2.

for such an analysis because a firm is not required to report market risk disclosures under more than one format.

If the tabular and sensitivity analysis disclosures capture different attributes of a firm's net market risk exposure, I expect my proxies from one format to exhibit incremental association over proxies from another format in explaining the firm's oil and gas betas. I assess such incremental association by combining the empirical models in equations (11) and (17):

$$\begin{aligned} R_{j,m} = {} & \theta_0 + \theta_1 \mathrm{MKTRET}_m + \theta_2 \Delta\mathrm{OPRICE\%}_m + \theta_3 \Delta\mathrm{GPRICE\%}_m \\ & + \theta_4(\Delta\mathrm{OPRICE\%}_m \times \text{value of proven oil reserves}_{j,y}/\mathrm{MVE}_{y-1}) \\ & + \theta_5(\Delta\mathrm{OPRICE\%}_m \times \text{notional value of oil derivatives-short}_{j,y}/\mathrm{MVE}_{y-1}) \\ & + \theta_6(\Delta\mathrm{GPRICE\%}_m \times \text{value of proven gas reserves}_{j,y}/\mathrm{MVE}_{y-1}) \\ & + \theta_7(\Delta\mathrm{GPRICE\%}_m \times \text{notional value of gas derivatives-short}_{j,y}/\mathrm{MVE}_{y-1}) \\ & + \theta_8(\text{SFAS No. 69 price revisions}_{j,y}/\mathrm{MVE}_{y-1}) \\ & + \theta_9(\text{fair value change in traded oil and gas derivatives}_{j,y}/\mathrm{MVE}_{y-1}) + \varepsilon_{j,m}. \qquad (18) \end{aligned}$$

Statistically significant θ_4, θ_5, θ_6, θ_7, θ_8 and θ_9 would suggest that the proxies for tabular format disclosures and the proxies of the sensitivity analysis disclosures are not substitutes for each other in explaining firms' oil and gas betas. As before, θ_4, θ_6 and θ_8 are expected to be positive, but θ_5, θ_7 and θ_9 are expected to be negative.

Table 5 reports that proxies for the tabular format and sensitivity disclosures *for the same set of firms* consistently exhibit incremental information over each other. For example, the notional value of oil and gas derivatives-short, representing the tabular format measure for derivatives, and SFAS No. 69 price revisions and fair value of traded derivatives, representing the sensitivity analysis measures, are significantly associated with oil and gas betas in the predicted direction (see column A). When the interaction variables for reliability and bias in reserve estimates are added to the specification (see column B), the coefficient on value of proven oil reserves adjusted for bias is 0.004 (0.049 − 0.045) and significant ($p = 0.03$). These findings are robust to addition of proxies to control for the incompleteness of SFAS No. 69 price revisions and fair value changes in traded derivatives.[16] Hence, the results provide evidence that the two forms of quantitative disclosure, namely the tabular and sensitivity analysis formats, are not entirely substitutable. Allowing firms to choose different formats for reporting their market risk exposure is likely to limit the inter-firm comparability of such disclosures.

VI. CONCLUSIONS

I examine the association between oil and gas price sensitivity and proxies for commodity risk exposure measures for a sample of oil and gas producers. The measures of derivatives and underlying exposure from reserves, derived from existing SFAS No. 119 and SFAS No. 69 disclosures, are analogous to tabular format and sensitivity analysis disclosures prescribed by SEC (1997) for all firms for fiscal periods ending after June 15,

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[16] The tenor of the results was unchanged when the interaction between $\Delta\mathrm{OPRICE\%}_m$ and $\Delta\mathrm{GPRICE\%}_m$ with three alternate accounting proxies for risk, namely size (market capitalization), leverage (debt-to-size) and market-to-book ratios, were added to the empirical specifications in equations (11), (17) and (18).

TABLE 5
Estimation of Oil and Gas Price Sensitivity and the Incremental Association of Tabular and Sensitivity Analysis Format Measures of Net Commodity Price Risk Exposure

Equation (18):

$$
\begin{aligned}
R_{j,m} = {} & \theta_0 + \theta_1 MKTRET_m + \theta_2 \Delta OPRICE\%_m + \theta_3 \Delta GPRICE\%_m \\
& + \theta_4(\Delta OPRICE\%_m \times \textit{value of proven oil reserves}_{j,y}/MVE_{j,y-1}) \\
& + \theta_5(\Delta OPRICE\%_m \times \textit{notional value of oil derivatives-short}_{j,y}/MVE_{j,y-1}) \\
& + \theta_6(\Delta GPRICE\%_m \times \textit{value of proven gas reserves}_{j,y}/MVE_{j,y-1}) \\
& + \theta_7(\Delta GPRICE\%_m \times \textit{notional value of gas derivatives-short}_{j,y}/MVE_{j,y-1}) \\
& + \theta_8(\textit{SFAS No. 69 price revisions}_{j,y}/MVE_{y-1}) \\
& + \theta_9(\textit{fair value change in traded oil and gas derivatives}_{j,y}/MVE_{y-1}) \\
& + \varepsilon_{j,m}
\end{aligned}
$$

		Tabular and Sensitivity Analysis Format Column A		*Tabular and Sensitivity Analysis Format with Omitted Variables and Reliability and Bias Corrections Column B*	
Independent Variables	*Pred. Sign*	*Coeff.*	*p-value*	*Coeff.*	*p-value*
Intercept	?	−0.004	0.27	−0.004	0.29
MKTRET	+	0.713***	0.00	0.709***	0.00
ΔOPRICE%	+	0.326***	0.00	0.298***	0.00
ΔGPRICE%	+	0.076***	0.00	0.075***	0.00
Tabular variables					
ΔOPRICE% × value of proven oil reserves	+	0.007	0.36	0.049**	0.05
ΔOPRICE% × notional value of oil derivatives-short	−	−0.573***	0.00	−0.595***	0.00
ΔGPRICE% × value of proven gas reserves	+	0.003	0.17	0.004	0.30
ΔGPRICE% × notional value of gas derivatives-short	−	−0.028*	0.10	−0.012*	0.09
Sensitivity analysis variables					
SFAS No. 69 price revisions	+	0.012**	0.00	0.011**	0.00
Fair value change in traded oil and gas derivatives	−	−0.069**	0.03	−0.061**	0.03

(*Continued on next page*)

TABLE 5 (Continued)

		Tabular and Sensitivity Analysis Format Column A		*Tabular and Sensitivity Analysis Format with Omitted Variables and Reliability and Bias Corrections Column B*	
Independent Variables	*Pred. Sign*	*Coeff.*	*p-value*	*Coeff.*	*p-value*
Reliability and bias corrections in tabular disclosures					
ΔOPRICE% × value of proven oil reserves × absolute revisions dummy	−			−0.006	0.40
ΔGPRICE% × value of proven gas reserves × absolute revisions dummy	−			0.002	0.38
ΔOPRICE% × value of proven oil reserves × signed revisions dummy	−			−0.045**	0.03
ΔGPRICE% × value of proven gas reserves × signed revisions dummy	−			−0.008**	0.05
Reserve change and OTC derivative proxies from sensitivity analysis disclosures					
ΔOPRICE% × quantity of oil reserve changes	+			−0.086	0.33
ΔGPRICE% × quantity of gas reserve changes	+			−0.003*	0.07
ΔOPRICE% × notional quantity of oil OTC derivatives-short	−			0.013	0.67
ΔGPRICE% × notional quantity of gas OTC derivatives-short	−			0.001	0.47
R^2		13.70%		14.06%	
F-value		18.34		13.51	

Data includes 89 firm-year observations over calendar years 1993 to 1996. The number of observations used in the regressions is 1068. The t-statistics used to report p-values are calculated using White's (1980) robust standard errors.

*,** indicate that coefficients are statistically different from zero at 0.10, 0.05 level, respectively, two-tailed test. Statistical significance is assessed for a one- (two-) tailed test when the hypothesized sign of the coefficient is predicted (not predicted). For variable definitions, see tables 1, 2, 3 and 4.

1998. The availability of SFAS No. 69 and SFAS No. 119 data provides the opportunity to test the risk-relevance of proposed risk disclosures now, rather than waiting until actual SEC (1997) data becomes widely available under alternative disclosure formats.

The results indicate that tabular format disclosures on derivatives and sensitivity analysis format disclosures of underlying exposure and derivatives are associated with firms' oil and gas price sensitivity. Disclosures of underlying exposure from firm's reserves under the tabular format are statistically associated with the firms' oil and gas price sensitivity for that subset of firms whose disclosures the market perceives to contain less measurement error than those of the median firm. The sensitivity analysis disclosures are associated with oil and gas price sensitivities. Thus, both formats suggested by the SEC provide information associated with firms' exposures to commodity price risk. Moreover, the alternate formats are not replacements for one another. They each have incremental information content in explaining firms' oil and gas price sensitivities.

Several factors limit the ability to generalize the findings to a broader population of firms. First, my sample includes firms that *voluntarily* disclose commodity derivative information. Thus, because of the possibility of self-selection bias, there is no assurance that the results from my sample would generalize to a broader population of firms that are required to disclose their derivative activities. Second, the present analysis is limited to firms in one industry. Although focusing on O&G firms enables me to make precise predictions about the sign of coefficients on proxies for SEC disclosures, results from the study may not readily generalize to other industries, especially when measures of underlying risk exposure are not readily available. Third, estimated fair value sensitivity measures, explained in section III, cannot be fully validated because only three firm-years in my sample explicitly report fair value sensitivity measures.

Subject to the above caveats, the paper provides early evidence suggesting that tabular and sensitivity analysis disclosures are risk-relevant and that the two formats reflect different attributes of commodity price risk. The fact that the formats reflect different risk attributes is likely to mean that investors will have difficulty in comparing the results of the risk management activities of firms that choose different disclosure formats. Just how the above caveats impact these results can be determined by studies that employ either alternate research methodologies such as laboratory markets (see Dietrich et al. 1998) or that examine the actual SEC (1997) disclosures, once the disclosures are widely available.

REFERENCES

Alciatore, M. 1990. The reliability and relevance of reserve value accounting data: A review of the empirical research. *Journal of Accounting Literature* 9: 1–38.

American Institute of Certified Public Accountants (AICPA). 1998. *Interpretation of AU Section 634, Letters for Underwriters and Certain Other Requesting Parties, Commenting in a Comfort Letter on Quantitative Disclosures About Market Risk Made in Accordance with Item 305 of Regulation S-K.* New York, NY: AICPA.

Clinch, G., and J. Magliolo. 1992. Market perceptions of reserve disclosures under SFAS No. 69. *The Accounting Review* 67 (October): 843–861.

Collins, D. W., and M. Venkatachalam. 1997. Derivatives disclosures and interest exposure of commercial banks. Working paper, University of Iowa, Iowa City, IA.

Dietrich, J. R., S. J. Kachelmeier, D. N. Klienmuntz, and T. J. Linsmeier. 1998. An experimental investigation of forward-looking non-financial performance disclosures. Working paper, University of Illinois at Urbana–Champaign and University of Texas at Austin.

Financial Accounting Standards Board (FASB). 1982. *Disclosure about Oil and Gas Producing Activities.* Statement of Financial Accounting Standards No. 69. Stamford, CT: FASB.

———. 1994. *Disclosure about Derivative Financial Instruments and Fair Value of Financial Instruments.* Statement of Financial Accounting Standards No. 119. Stamford, CT: FASB.

Lehn, K. 1997. Testimony concerning disclosure of accounting policies for derivatives and disclosures of quantitative and qualitative information about market risk inherent in market risk sensitive instruments before the Subcommittee on Securities Committee on Banking, Housing, and Urban affairs. 105th Congress, 1st session, March 4.

Linsmeier, T. J., and N. D. Pearson. 1997. Quantitative disclosures of market risk in the SEC release. *Accounting Horizons* 11 (March): 107–135.

Logan, D. T., and P. M. Montgomery. 1997. Testimony on behalf of the Treasury Management Association concerning disclosure of accounting policies for derivatives and disclosures of quantitative and qualitative information about market risk inherent in market risk sensitive instruments before the Subcommittee on Securities Committee on Banking, Housing, and Urban affairs. 105th Congress, 1st session, March 4.

Magliolo, J. 1986. Capital market analysis of reserve recognition accounting. *Journal of Accounting Research* 24 (Supplement): 69–108.

Miller, M., and C. Upton. 1985a. A test of the Hotelling valuation principle. *Journal of Political Economy* 93 (February): 1–25.

———, and ———. 1985b. The pricing of oil and gas firms: Some further results. *Journal of Finance* 40 (July): 1009–1018.

Nabar, S. 1995. The usefulness of hedging disclosures: Evidence from the precious metal mining industry. Working paper, University of Texas at Austin.

Pillof, S. J. 1994. The impact of derivatives on bank risk and value. Working paper, University of Pennsylvania, Philadelphia, PA.

Schrand, C. M. 1997. The association between stock-price interest rate sensitivity and disclosures about derivative instruments. *The Accounting Review* 72 (January): 87–109.

Securities and Exchange Commission (SEC). 1997. *Disclosure of Accounting Policies for Derivative Financial Instruments and Derivative Commodity Instruments and Disclosure of Qualitative and Quantitative Information about Market Risk Inherent in Derivative Financial Instruments, Other Financial Instruments, and Derivative Commodity Instruments.* Release Nos. 33-7386; 34-38223; IC-22487; FR-48; International Series No.1047; File No. S7-35-95 (January 31, 1997). Washington, D.C.: Securities and Exchange Commission.

Sefcik, S., and R. Thompson. 1986. An approach to statistical inference in cross-sectional models with security abnormal returns as dependent variable. *Journal of Accounting Research* 24 (Autumn): 316–334.

Standard and Poor's. 1997. Industry survey. *Oil and Gas: Production and Marketing* (September 11).

Stulz, R. M., and R. Williamson. 1997. Identifying and quantifying exposures. Working paper, Ohio State University.

Tufano, P. 1998. The determinants of stock price exposure: Financial engineering and the gold mining industry. *Journal of Finance* 53 (June): 1015–1052.

U.S. Senate Subcommittee on Securities. 1997. *Report on Proposals by the Securities and Exchange Commission and the Financial Accounting Standards Board for the Accounting Treatment of Financial Derivatives* (April 21).

White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* (May): 817–838.

Wong, F. L. 1997. The usefulness of SFAS No. 119 disclosures to assess the foreign currency exposure of manufacturing firms. Working paper, University of California at Berkeley.

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The Audit Risk Model, Business Risk and Audit-Planning Decisions

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ABSTRACT: This study identifies conditions under which the audit risk model does, and does not, describe audit-planning (investment and pricing) decisions. In an experiment, audit partners and managers examined one of two cases where a material misstatement—error or irregularity—was discovered. The auditors assessed the elements of the audit risk model, assessed business risk and provided recommendations for the audit investment and fee. When the likelihood of an error was high, the audit risk model dominated business risk in the explanation of the audit investment, and the fee did not contain a risk premium. When the likelihood of an irregularity was high, business risk dominated the audit risk model in the explanation of the audit investment, and the fee contained a risk premium. These results suggest that the ability of the audit risk model to describe auditor behavior and the inclination of auditors to charge a risk premium depend upon the nature of the risks present in the audit. In the presence of errors, the audit risk model adequately described audit-planning decisions; in the presence of irregularities it did not.

Key Words: *Audit risk model, Business risk, Audit fees, Audit evidence.*

Data Availability: *Contact the authors.*

I. INTRODUCTION

Auditors have been shown to adjust the elements of the audit risk model (ARM) and increase the audit investment in response to increasing risk that client financial statements contain material misstatements (e.g., Joyce 1976; Gaumnitz et al. 1982;

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Kaplan 1985; Libby et al. 1985; O'Keefe et al. 1994). There is also evidence that auditors respond to business risk—the risk of loss or injury to an auditor's professional practice due to client relationships—by increasing the investment in the audit and/or charging fees above the amounts required to cover the costs of conducting audits (e.g., Pratt and Stice 1994; Walo 1995). While this research suggests that auditors react to both audit and business risk, it does not identify the conditions under which audit decisions reflect business risks not captured by the ARM. In such cases, the ARM, a standard of professional audit practice, fails to describe audit behavior.

The ARM primarily addresses the risks associated with issuing unqualified audit opinions on client financial statements that contain material misstatements. Business risk, on the other hand, is present even when auditors comply with generally accepted auditing standards (GAAS) and render appropriate audit opinions. The primary costs associated with business risk relate to litigation, whether the exposure leads to auditors being held liable for client stakeholder losses. Other costs relate to sanctions imposed by regulatory bodies, impaired reputation and failure to collect fees. Business risk encompasses more than the risks associated with issuing unqualified opinions on materially misstated financial statements. A client with a weak internal control system experiencing financial difficulty, for example, introduces two kinds of risks: the risk of a material misstatement and the risk of financial failure. The ARM reflects only the first; business risk encompasses both.

The ARM has been designed to serve as a guide for audit planning (Cushing et al. 1995; AICPA 1997a). Sometimes the guidance provided by the ARM is clouded when business risk is brought into juxtaposition with the risk captured by the ARM. Arens and Loebbecke (1997, 259) suggest that there is disagreement about whether auditors should, or should not, adjust acceptable audit risk for differences in business risk. They report that some auditors believe that acceptable audit risk should be lower for clients that present high levels of business risk, while others do not. We contend that differences in the nature of the underlying circumstances that give rise to business and audit risk will lead to different responses by auditors. In some cases, auditors will adjust their audit plans for the underlying circumstances in ways completely captured by the ARM, but in other cases auditor responses will not be captured by the ARM. In the former cases, the ARM will describe auditor behavior; in the latter cases it will not.

Auditors are responsible for providing reasonable assurance that financial statements are free of material misstatements. Misstatements, however, can arise from either of two sources—errors (unintentional misstatements) and irregularities (intentional misstatements)—and, as we argue below, the ability of the ARM to describe audit behavior appears to depend upon the source. We monitor two aspects of auditor responses to audit and business risk—the amount of investment planned for the audit and the extent to which the audit fee contains a premium to compensate auditors for bearing risk.

We hypothesize that the variance in the audit investment explained by business risk, over and above that explained by elements of the ARM, is greater when the risk stems from irregularities rather than from errors. When the audit involves a risk of undetected irregularities, the ARM fails to capture dimensions of business risk that auditors consider when planning the audit investment. When the risk of undetected errors is high, on the other hand, relevant dimensions of business risk are reflected in the ARM.

We also predict that audit fees contain (do not contain) a risk premium when the risk of irregularities (errors) is high. When the risk of irregularities is high, standard audit procedures cannot reduce the risks to tolerable levels, so a premium is added to the fee. Conversely, when the risk of errors is high, standard audit procedures are sufficient to reduce risks to tolerable levels, and auditors will not perceive a need for a risk premium.

We tested these hypotheses in an experiment using, as subjects, 34 audit partners and managers from four Big 5 accounting firms. Each considered one of two high-risk cases where a material misstatement was revealed while conducting preliminary analyses and inquiries of a prospective client's accounting personnel. The two cases described the discovery of either an error or irregularity, thereby suggesting that the risk of other, undetected errors or irregularities was high. Auditors assessed the elements of the ARM and business risk and made recommendations for the audit investment and fee both before and after discovering the misstatement.

The results support the hypotheses, suggesting that both the ability of the ARM to describe planned audit investments and auditor inclinations to include risk premiums in audit fees depend upon the nature of the risks present in the audit. In the error condition, the ARM explained significant variance in the audit investment and business risk added no additional explanatory power; in the irregularity condition, business risk dominated the ARM in the explanation of the audit investment. Further, the audit fee did not contain a risk premium in the error condition—the fee reflected only the costs of the audit investment; in the irregularity condition, auditors proposed a fee that exceeded the amount needed to cover the planned audit investment.

These results question whether current audit standards are providing useful guidance in the presence of irregularities (see Shibano [1990] for a related argument). An important purpose of professional standards, like the ARM, is to promote consistency across audit engagements (Cushing et al. 1995), but in the case of irregularities where auditors appear to depart from the ARM, it is unlikely that the standard is helping to achieve that goal. The results also are consistent with Menon and Williams (1994), who state that it is important that audit fees reflect the insurance service auditors provide for their clients—especially risky clients. Audit fees appear to include risk premiums when the risk of irregularities is high.

Prior research examining relationships among audit risks, investment and fees has used both behavioral and archival methods. Several behavioral studies, for example, have found relationships between inherent and/or control risk and audit investment (e.g., Joyce 1976; Gaumnitz et al. 1982; Libby et al. 1985). More recently, Pratt and Stice (1994) related client characteristics to audit investment and provided evidence of risk premiums in the presence of business risk. However, the authors neither measured the elements of the ARM nor identified contextual factors that cause risk premiums.

Prior archival research generally has failed to find relationships between inherent and/or control risk and audit investment (e.g., Bedard 1989; Mock and Wright 1993; O'Keefe et al. 1994; Hackenbrack and Knechel 1997). Such relationships may be difficult to identify in archival settings because direct and timely measures of risk are not readily available. This limitation forces archival researchers to infer risk assessments from the data and/or elicit them after completion of the audit—in some cases from auditors who did not make the actual audit-planning judgments. In addition, archival studies must rely upon relatively crude proxies for inherent and control risk (e.g., categorical variables coded as 0, 1) that are unlikely to reflect the level of risks in specific audit contexts. Finally, while archival studies have shown that audit fees increase in the presence of factors associated with business risk, they have been unable to determine whether the fee increases are attributable to greater audit investments or risk premiums (Simunic and Stein 1996).

Our experimental approach elicits direct measures of audit risk, business risk, and planned audit investment and fees, holding constant factors such as client attributes, industry, auditor background and the audit environment. We also manipulate the nature of the event underlying the risk—discovery of an error or irregularity—enabling us to examine whether the relationships among audit risk, business risk and audit investment depend upon whether the business risks arise from potential undetected material errors or irregularities. In addition, we test the extent to which audit fees are explained by the audit investment and/or business risk for errors and irregularities, in order to examine the conditions under which fees contain risk premiums rather than extra compensation for additional audit effort.

The next section contains a description of the audit risk and audit-planning models, followed by the development of the hypotheses. We then describe the experimental design and present the results. Conclusions and suggestions for future research complete the paper.

II. THEORY AND HYPOTHESES

In this section, we use the ARM and an audit-planning model to provide a framework for developing the hypotheses. We predict differences between errors and irregularities in terms of whether (1) business risk provides explanatory power for the audit investment beyond the elements of the ARM; and (2) the audit fee contains a risk premium.

Audit Risk Model and the Explanation of Audit Investment

SAS No. 47 requires auditors to use the ARM as part of the audit planning process (AICPA 1997a). The following presentation of the ARM, including variable definitions, is adapted from SAS No. 47:

$$\text{Detection Risk} = \frac{\text{Acceptable Audit Risk}}{\text{Inherent Risk} \times \text{Control Risk}} \tag{1}$$

where:

Acceptable audit risk (AAR) is the probability that auditors are willing to accept that they will render unqualified opinions on materially misstated financial statements. AAR is set by the auditor.

Inherent risk (IR) is the probability that an account balance or class of transactions contains a material misstatement before considering the effectiveness of the internal control system. IR is assessed by the auditor.

Control risk (CR) is the probability that a material misstatement is not prevented or detected on a timely basis by the internal control system. CR is assessed by the auditor.

Detection risk (DR) is the tolerable level of risk that auditing procedures will not detect material misstatements.

Materiality is the magnitude of an omission or misstatement of accounting information that, in light of surrounding circumstances, makes it probable that the judgment of a reasonable person relying on this information would have been changed or influenced by the omission or misstatement. Because AAR, IR, CR and DR all depend upon a preset level of materiality, materiality affects the levels of all other elements in the ARM.

According to the ARM, auditors set materiality and choose AAR; IR and CR are then assessed, which leads to a tolerable level of DR. Investments in auditing decrease DR, and the planned level of audit investment reflects that point where a tolerable level of DR is achieved.

Audit-Planning Model and the Explanation of Audit Fees

Simunic (1980) developed a model to explain audit fees, later used by Pratt and Stice (1994) as a basis for examining audit-planning decisions. We modify this model as follows to represent the expected costs of auditing:

$$E(c) = cq + [E(d) \times E(r)] + [E(f) \times E(p)] \tag{2}$$

where:

E(c) = total expected cost.
c = the per unit factor cost of external auditor resources to the auditor, including all opportunity costs.
q = the quantity of resources utilized by the auditor in performing the audit examination.
E(d) = expected present value of possible future losses incurred by client stakeholders that are associated with undetected material misstatements in this period's financial statements.
E(r) = expected likelihood that the auditor will be held responsible for client stakeholder losses associated with undetected material misstatements in this period's financial statements.
E(f) = expected present value of possible future losses caused by being identified with this period's financial statements due to factors other than undetected material misstatements.
E(p) = expected likelihood that the auditor will suffer losses as a result of being identified with this period's financial statements because of factors other than undetected material misstatements.

In the planning model, [E(d) × E(r)] and [E(f) × E(p)] represent the expected costs of business risk; [E(d) × E(r)] represents costs associated with undetected material misstatements and [E(f) × E(p)] represents costs associated with factors other than undetected material misstatements (e.g., reputation losses caused by association with clients of questionable integrity). According to the model, audits are planned in the following way: (1) assess the level of business risk and (2) invest in auditing, q, to the point where the marginal reduction in the costs of business risk from an additional unit of auditing is equal to the marginal cost of that unit of auditing. In equilibrium, audit fees are set to cover the total expected costs of auditing, which include a normal profit.[1]

The ARM and Business Risk

The ARM is designed to help auditors manage risks associated with issuing unqualified opinions on financial statements that contain undetected material misstatements. Consequently, the elements of the ARM can be adjusted, and the audit investment increased, to reflect that portion of business risk associated with [E(d) × E(r)] (Brumfield et al. 1983; Messier 1997; Arens and Loebbecke 1997). Changes in audit investments attributable to changes in AAR, IR, CR and/or materiality are consistent with both the ARM and changes in business risk associated with [E(d) × E(r)]. In other words, many factors that relate to the likelihood of material misstatements similarly affect business risk. Examples include high levels of accounts receivable and inventory, and excessive sales growth (Stice 1991).

Business risk encompasses an additional factor, [E(f) × E(p)], that is not associated with the risk of undetected material misstatements and thus is not explicitly reflected in the ARM. Poor financial condition and high stock price variability, for example, have been shown to introduce dimensions of business risk that are independent of the risk of undetected material misstatements (Brumfield et al. 1983; Stice 1991). In the presence of these factors, audit standards provide limited guidance. SAS No. 47 (AICPA 1997a) states only that, in the presence of low business risk, auditors should not reduce the audit investment below that implied by the ARM. This ambiguity may explain why audit firms set relatively rigid guidelines in the implementation of the ARM, perhaps in an attempt to achieve consistency across audits. Studies have shown, for example, that audit firms have policies that set AAR at predetermined levels (Jiambalvo and Waller 1984; Daniel 1988; Knechel 1998; Ricchiute 1998), whether AAR is set qualitatively (e.g., "low") or quantitatively (e.g., 5 percent).[2]

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[1] Consistent with professional standards (i.e., the ARM), q should reflect at least the audit investment required to achieve a tolerable level of DR, which is a function of AAR, IR, CR and materiality.

Hypothesis 1

The discovery of an irregularity raises serious questions about management and casts doubt on the integrity of the financial statements. In addition, auditors may suffer damaging reputation effects or be sued (perhaps without merit) as a result of involvement with unscrupulous clients, whose financial statements are later found to contain undetected immaterial misstatements, or who experience business failure.[3] Consequently, irregularities introduce high levels of business risk that are comprised of two components: (1) high risk of undetected material misstatements [E(d) × E(r)] and (2) high potential costs unrelated to undetected material misstatements [E(f) × E(p)]. The ARM does not reflect the second component, so we predict that in the presence of irregularities, business risk will have incremental explanatory power over the components of the ARM in the explanation of planned audit investments. Errors, on the other hand, introduce levels of business risk comprised only of the first component, [E(d) × E(r)]. This component is associated with the risk of a material error and is within the scope of the ARM. Thus, in the presence of errors, we predict that business risk will have no incremental explanatory power over the components of the ARM in the explanation of planned audit investments.

> **H1:** The incremental effect of business risk—over and above that of audit risk—on planned audit investment is greater when the risk of irregularities is high than when the risk of errors is high.

Hypothesis 2

Errors and irregularities also differ in terms of whether audit fees contain risk premiums. When the risk of irregularities is high, normal audit procedures may not be able to control business risk sufficiently. Irregularities are more difficult to detect than errors (Shibano 1990; Graham 1985)[4] and they raise additional issues (discussed in the development of H1) about the client that cannot be controlled by gathering additional audit evidence. In other words, neither [E(d) × E(r)] nor [E(f) × E(p)] can be reduced to acceptable levels by applying normal audit procedures. Consequently, auditors will add a risk premium to the audit fee to compensate them for bearing the uncontrolled business risk.

When the risk of errors is high, the proposed audit fee should reflect only the level of audit investment. In this case, [E(f) × E(p)] is negligible and the risks associated with [E(d)

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[2] We spoke to representatives from each of the four Big 5 firms that provided subjects about their policies for setting AAR. While firm policies require auditors to consider factors that theoretically could affect AAR, firm policies do not allow AAR to vary. Consistent with these policies, we report later that auditors in this study did not decrease AAR after the discovery of an error or irregularity.

[3] Because juries often hold auditors to tighter standards than those described in professional audit standards, stakeholders may be motivated to file lawsuits against auditors even in the absence of undetected material misstatements.

[4] Similarly, auditors simply may not know how to change audit programs to detect irregularities (e.g., see Hoffman 1997).

× E(r)] can be controlled by applying normal audit procedures. In terms of the audit-planning model, audit fees will reflect only the costs of the audit investment (i.e., cq) and not include a risk premium.

H2: The incremental effect of business risk—over and above that of audit investment—on audit fees is greater when the risk of irregularities is high than when the risk of errors is high.

III. RESEARCH DESIGN

Subjects and Case Distribution

Audit cases describing one of two high-risk conditions involving the discovery of material misstatements were distributed to 34 audit partners and managers from four Big 5 accounting firms (17 subjects—14 managers and three partners—for each of the two conditions).[5] Cases were randomly distributed by a contact person within each firm and returned directly to the researchers in stamped, self-addressed envelopes. Although contact people were asked to return undistributed cases so that we could determine the response rate, some did not. However, 60 percent of the distributed cases were completed.

The Case

Each subject analyzed one case, consisting of four parts; parts 1, 2 and 4 were the same across both conditions. Part 1 contained a preliminary analysis of a potential new client, summarizing the client's management, operations, financial statements, ratios and industry comparisons. Part 2 asked subjects to assess the elements of the ARM, to assess business risk and to recommend an audit investment and audit fee. In part 3, a short paragraph describing the information unique to each condition was introduced. This paragraph indicated the subsequent discovery of a material misstatement—condition 1 described the discovery of an error (an unintentional inventory misstatement) and condition 2 described the discovery of an irregularity (an intentional inventory misstatement) during preliminary analyses and inquiries of the client's accounting personnel. In the irregularity condition, management knew that the inventory accounting method was inconsistent with GAAP, but chose it anyway—openly communicating the choice throughout the company.[6] The discovery of the error (irregularity) was intended to convey an increased risk that other, undetected errors (irregularities) exist. See table 1 for the exact wording of each condition. In part 4, the subjects were asked to answer the same questions as in part 2. We extensively pilot tested the case with several Big 5 audit partners and managers, some of whom were involved in developing risk assessment policies for their firms.

Measures of the ARM, Business Risk and Audit Planning

Measures of the ARM included assessments of materiality, AAR, IR and CR. All risk measures were defined in words, rather than in percentages, because Big 5 firms typically

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[5] Nonparametric Mann-Whitney U-tests confirmed that manager and partner responses did not differ within each of the experimental conditions. In addition, subjects indicated whether the case information represented the important factors that they consider in actual audits (1 = Agree strongly to 11 = Disagree strongly). The mean response was 3.4 (s.d. = 1.16; 33 of 34 subjects responded 4 or less), suggesting that the case fairly represented the information that auditors consider during audit planning.

[6] Although accounting methods inconsistent with GAAP are acceptable under certain circumstances (e.g., when the financial statements would be misleading if GAAP were followed), nothing in the case materials suggested that the purpose of the departure from GAAP in the irregularity condition was to improve the quality of the financial statements.

TABLE 1
Description of the Two Conditions

Scenario 1: Error

In a new development, preliminary analyses and inquiries of the Corporation's accounting personnel revealed an accounting treatment, instituted near the beginning of the current fiscal year, that is inconsistent with GAAP. Further inquiry and two internal memos verify that the treatment was *unintentional* and resulted from a miscommunication within the controller's office that was passed along to regional accounting departments. Competent audit staff concluded that it is highly unlikely that management was aware of this error. Nevertheless, the error affects all of the different segments of the Corporation's geographically dispersed inventory. As a result, inventory and net income are likely to be significantly overstated.

Scenario 2: Irregularity

In a new development, preliminary analyses and inquiries of the Corporation's accounting personnel revealed an accounting treatment, instituted near the beginning of the current fiscal year, that is inconsistent with GAAP. Further inquiry and two internal memos suggest that the treatment was *intentional* and was communicated by the controller's office to regional accounting departments. Competent audit staff suspect that it is highly likely that management is aware that this treatment is inconsistent with GAAP and supports it. The accounting treatment affects all of the different segments of the Corporation's geographically dispersed inventory. As a result, inventory and net income are likely to be significantly overstated.

measure CR and IR in words (Janell and Wright 1991; Martinov and Roebuck 1998); only two of the 34 subjects indicated that they typically define AAR, IR and/or CR in percentages. Also, materiality was measured by the magnitude of a misstatement (in dollar terms) that would cause auditors to recommend an adjusting journal entry.[7] Consistent with Pratt and Stice (1994) and Simunic and Stein (1996), the measure of business risk consisted of assessing the firm's exposure to litigation associated with auditing the client. Audit planning was measured by asking the subjects to assess how much evidence would be needed to complete the audit (audit investment) and how large an audit fee would be recommended (audit fee). All variables, except materiality, were measured on 11-point scales (1 = Much lower than normal to 11 = Much higher than normal). Table 2 contains the exact wording of each measure.[8]

In the experimental design, measures of the ARM, business risk and the audit-planning recommendations were taken both before and after the discovery of the misstatement, and

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[7] Because materiality is effectively an implicit parameter of the audit risk model, it is important that we control for materiality in the empirical tests. We based our statistical analyses on the journal entry form of materiality (i.e., auditing materiality) because it reflects the issues auditors consider when they plan audits (Messier 1997; Martinov and Roebuck 1998). We also measured materiality in terms of its formal definition—the size of a misstatement that would change financial statement user judgments or decisions, which is often referred to as accounting materiality. Accounting materiality, usually greater than auditing materiality, is often used as a starting point for determining auditing materiality. Results were unchanged by using accounting materiality instead of auditing materiality in the analyses.

[8] In this study, risk assessments were elicited at a financial statement rather than account-balance, class-of-transactions, or assertion level. While SAS No. 47 states that auditors should set AAR and materiality at the financial statement level, it explicitly states that auditors make inherent and control risk assessments only at the account-balance or class-of-transactions level. However, both Martinov and Roebuck (1998) and Janell and Wright (1991) report that many audit firms require inherent and control risk assessments at the financial statement level as well as account-balance or class-of-transactions level. In this study, financial statement-level assessments allow subjects to consider the risk of misstatements in accounts other than inventory. In addition, the audit partners and managers involved in pilot tests, many of whom participated in formulating their firm's risk-assessment policies, confirmed that these risk assessments were consistent with audit-planning practices for new clients.

TABLE 2
Measures of Variables[a]

Elements of the Audit Risk Model

Materiality: For the Corporation, if you discovered a misstatement, how large (in dollars) would it have to be before you would recommend that management make an adjusting entry?

Acceptable Audit Risk: What is the risk you are *willing to accept* that your firm will render an unqualified opinion on the Corporation's financial statements that are materially misstated?

Inherent Risk: What is the risk that the Corporation's financial statements contain a material misstatement before considering the effectiveness of the internal control system?

Control Risk: What is the risk that a material error or omission is not prevented or detected on a timely basis by the Corporation's internal control system?

Business Risk

Litigation Risk: Assess the exposure to litigation associated with auditing the Corporation.

Overall Risk

Overall Risk: What is the overall risk associated with the audit of the Corporation?

Audit-Planning Recommendations

Audit Investment: How much audit evidence would you collect to complete the audit of the Corporation?

Audit Fee: Remember that Manufacture, Inc. will be billed on a fixed fee and that you are in a competitive bidding situation. How large an audit fee would you recommend that the Corporation be charged?

[a] For all measures, 1 = Much lower than normal, 11 = Much higher than normal, except for materiality, which was measured in dollars.

in the analyses we focus on changes in these variables—the difference between part 4 and part 2. Positive (negative) numbers indicate that the revised assessment is greater than (less than) the preliminary assessment. Analyzing changes increased statistical power by controlling for firm and individual differences; subjects served as their own control.[9]

IV. RESULTS

Manipulation Checks and Preliminary Analyses

Table 3 reports preliminary responses (before discovery of the error or irregularity) and revised responses (after the discovery of the error or irregularity) for the ARM, business risk and the audit-planning measures, as well as differences (i.e., changes) between the preliminary and revised responses. The preliminary assessments of these measures did not differ between the two conditions ($p > .10$ for all measures), suggesting that differences in change measures between the experimental conditions are not due to differences in the preliminary responses. Initial risk assessments all approximated the scale midpoint.

In both conditions, the changes in audit investment, audit fee, overall risk, IR and CR were significantly greater than zero. These results indicate that the auditors perceived greater risk when the error and the irregularity were discovered, and accordingly recommended increases to both the audit investment and fee. Note that AAR did not change when subjects were presented with either the error or irregularity, which is consistent with evidence that

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[9] The results reported in the next section are qualitatively the same as those reported when (1) all variables are measured using levels (i.e., revised responses from part 4 of the case) rather than changes, and (2) percentage risk assessments for elements of the ARM are used.

TABLE 3
Descriptive Statistics
Overall Risk, Business Risk, Audit Risk and Planning Decisions by Condition

	Error $n = 17$			*Irregularity* $n = 17$		
	Initial	*Revised*	*Change*	*Initial*	*Revised*	*Change*
Overall Risk	5.23	6.41	1.18**	4.79	8.08	3.29**
	(1.15)	(1.00)	(1.13)	(1.24)	(1.89)	(1.99)
Business Risk	5.35	5.76	0.41	4.41	8.47	4.06**
	(1.66)	(1.56)	(1.06)	(1.62)	(1.87)	(2.36)
Audit Risk	5.31	5.06	−.25	4.70	4.29	−.41
	(1.82)	(1.68)	(1.02)	(1.61)	(2.31)	(2.21)
Inherent Risk	5.71	6.65	0.94*	5.29	7.82	2.53**
	(1.53)	(1.97)	(1.52)	(1.26)	(2.13)	(2.62)
Control Risk	5.30	6.59	1.29**	5.64	8.35	2.71**
	(1.31)	(1.97)	(1.45)	(1.27)	(2.18)	(2.28)
Materiality	147.941	147.059	−.882	164.418	106.182	−58.236[a]
	(149.9)	(150.8)	(3.6)	(159.6)	(129.8)	(114.7)
Audit Investment	6.59	7.24	.65*	6.25	8.63	2.38**
	(1.12)	(1.30)	(.996)	(1.26)	(1.45)	(2.12)
Audit Fee	5.64	6.41	.77**	5.62	8.38	2.76**
	(1.46)	(1.80)	(.831)	(1.12)	(1.27)	(1.60)

Figures in table are means (standard deviations). Results of two-tailed t-tests of whether mean different from zero: * $p < .05$; ** $p < .01$.

[a] $p = .052$.

None of the initial assessments differed across conditions ($p > .10$), suggesting that any differences in change measures across conditions are not attributable to differences in initial responses.

All risk measures, audit investment and audit fee are measured on 11-point scales (1 = "Much lower than normal" to 11 = "Much higher then normal"). Lower acceptable audit risk represents less willingness to provide an unqualified opinion on materially misstated financial statements. Higher inherent and control risk represent a greater chance of a material misstatement. Positive numbers for investment and fee represent greater amounts of investment and a higher fee.

Materiality is measured in dollars (and presented in thousands of dollars). Lower materiality represents a lower required threshold to make an adjusting journal entry.

firms set AAR at predetermined levels. Consistent with prior research (e.g., Jiambalvo and Waller 1984; Daniel 1988), the mean response for AAR—expressed as a percentage—was 5 percent; approximately half of the subjects set AAR at 5 percent. To simplify the presentation, we excluded AAR from the subsequent analyses reported in the paper, which had no effect on the results.

In the irregularity condition, the changes are considerably larger than those associated with the error. The irregularity appeared to raise a more extensive set of risk issues, reflected by the increase in business risk, which does not occur in the error condition. Auditors also responded to the discovery of the irregularity by reducing the materiality threshold, which also did not occur in response to the error.[10]

Other measures—not reported in table 3—suggest that the manipulations were successful. In the error condition, changes in subject assessments of the risk of a material error were significantly greater than zero (mean = 2.53, $p < .001$). In the irregularity condition, changes in subject assessments of the risk of a material irregularity were significantly greater than zero (mean = 4.35, $p < .001$). These results indicate that the discovery of the error (irregularity) increased the perceived risk that other, undetected errors (irregularities) exist.[11]

Hypotheses Tests

We tested the two hypotheses by creating two regressions, the results of which are represented in panels A and B of table 4. The test of H1 (panel A) is based on a regression in which changes in the audit investment served as the dependent variable, while the independent variables included experimental condition (error = 0, irregularity = 1), change in business risk, the interaction between change in business risk and experimental condition and changes in elements of the ARM (except AAR). Hypothesis 1 is supported if the coefficient on the interaction term (Business Risk × Condition) is positive and significant, and the remaining variables served as controls. While not formally hypothesized, expected signs are provided for the control variables. Conceivably, changes in business risk and the components of the ARM could all relate to changes in planned audit investment, so these relationships were controlled while testing to see whether the relationship between business risk and planned audit investment differs across the error and irregularity conditions.

The test of H2 (panel B, table 4) is based on a regression in which changes in the audit fee served as the dependent variable. Independent variables include experimental condition (error = 0, irregularity = 1), change in business risk, the interaction between change in business risk and experimental and change in audit investment. H2 is supported if the coefficient on the interaction term (Business Risk × Condition) is positive and significant, and again the remaining variables served as controls. Increases in both business risk and audit investment could lead to higher levels of planned audit investment, so these variables are controlled while testing to see whether the relationship between business risk and audit fees differs across the error and irregularity conditions. The statistical tests in table 4 (panels A and B) are one-tailed tests.[12]

Test of Hypothesis 1

In panel A of table 4 the regression model is significant ($F = 8.19$; $p < .001$) and has an adjusted R^2 of .567. The significant positive coefficient on Business Risk × Condition

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[10] The $58,236 recommended decrease to materiality represented .07 percent, .05 percent and 1.06 percent of total assets, sales and income before taxes, respectively—common bases used by auditors to establish materiality. Auditors are expected to reduce planning materiality based on qualitative factors, such as the discovery of irregularities (Messier 1997; Arens and Loebbecke 1997).

[11] Results further suggest that subjects in the error (irregularity) condition did not (did) perceive an increased risk of an irregularity (error) after receiving the experimental manipulation ($p = .169$ [$p = .049$]).

[12] We performed a variety of diagnostic tests on all of the regression equations reported in this study. First, Kolmogorov-Smirnov tests suggest that error terms were normally distributed. Second, there do not appear to be problems associated with multicollinearity—variance inflation factors are all less than 5, where multicollinearity problems are indicated by variance inflation factors in excess of 20 (Greene 1990). In addition, there are no outliers as none of the standardized residuals exceed 2. Outliers often are identified when standardized residuals exceed 4 (Neter et al. 1996). Finally, pairwise correlations (parametric and nonparametric) between the independent variables and dependent variables are consistent with the regression results. See Neter et al. (1996) for detailed descriptions of each of these diagnostic tests.

TABLE 4
Tests of Hypotheses 1 and 2

Variables[b]	*Expected Sign*	*Coefficient (t-statistic)*
Panel A: Dependent Variable is Change in Audit Investment		
Intercept		.332 (.91)
Condition[a]		−.297 (−.41)
ΔBusiness risk	+	−.127 (−.43)
ΔBusiness Risk × Condition	+	.591 (1.77)*
ΔMateriality	−	.000005 (1.83)
ΔInherent risk	+	−.056 (−.46)
ΔControl risk	+	.327 (2.27)*
Adjusted R^2		.567
F-statistic (p-value)		8.19 (<.001)
Panel B: Dependent Variable is Change in Audit Fee		
Intercept		.609 (3.01)**
Condition[a]		−.113 (−.270)
ΔBusiness risk	+	−.175 (−1.02)
ΔBusiness Risk × Condition	+	.528 (2.63)**
ΔAudit investment	+	.352 (3.46)**
Adjusted R^2		.794
F-statistic (p-value)		32.89 (<.0001)

For both regressions, n = 34.

*, ** Significant at .05 and .01 levels in one-tailed tests, respectively.

[a] Condition is a dummy variable coded 0 for error and 1 for irregularity.

[b] Δ indicates that the variable represents a subject's assessment after the discovery of the misstatement less the assessment taken before the discovery.

($p < .05$) supports H1, suggesting that the variance in the audit investment explained by business risk—over and above that explained by the ARM—is greater in the irregularity condition than in the error condition. Of the elements of the ARM, only CR is significant ($p < .05$), with higher CR assessments associated with a greater audit investment.

Test of Hypothesis 2

The results reported in panel B of table 4 strongly support H2. The regression model is significant ($F = 32.89$; $p < .0001$) and has an adjusted R^2 of .794. The significant positive coefficient on Business Risk × Condition ($p < .01$), and the insignificant coefficient on business risk suggest that business risk explains variance in the audit fee beyond that explained by the audit investment only in the irregularity condition. The significance of the audit investment variable suggests that changes in audit investment move with changes in audit fees.[13]

Additional Analyses

This section reports analyses that examine the simple effects of business risk on audit investment (H1) and audit fees (H2) within each condition. In the additional test of H1, two regressions were constructed for each condition (error and irregularity). Changes in the audit investment served as the criterion variable in both equations, while the explanatory variables differed. In equation (1), the elements of the ARM represented the only explanatory variables; in equation (2), measures of both business risk and the elements of the ARM were included. Business risk was considered to provide incremental explanatory power if its coefficient in equation (2) was significant (Neter et al. 1996).[14] The results are reported in table 5.

In the error condition, the changes in the elements of the ARM alone (equation [1]) provide considerable explanatory power for the audit investment (adjusted $R^2 = .364$). CR appeared to dominate the other elements of the ARM. Apparently, auditors judged the error to reflect a control failure. Here, business risk (equation [2]) played virtually no role; it was not significant and adding it to the equation did not increase the overall explanatory power of the model.[15]

In the irregularity condition, the addition of business risk (equation [2]) dramatically increased the adjusted R^2, from .254 to .460. In equation (2), business risk replaced CR as the only significant variable, suggesting that business risk captured not only the risks associated with CR, but also additional risks not reflected by the ARM.

The results reported in table 6 provide an additional test of H2—whether the audit fee contains a risk premium. These results were generated by constructing regression equations for each of the two conditions with audit fee serving as the criterion variable, and audit investment and business risk serving as explanatory variables. A risk premium in the audit fee can be inferred if the coefficient on business risk is significant in the presence of the audit investment measure.

These results indicate that, for the error condition, the audit investment is significant ($p < .01$) and business risk is not ($p = .242$). In other words, the higher proposed fee

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[13] In both regressions, the insignificant coefficients on Condition and significant coefficients on Business Risk * Condition suggest that differences in the dependent variables are attributable to differences in the nature of business risk across conditions.

[14] The formal test involves computing a partial F-statistic to examine whether an added variable contributes to the explanatory power of the model. When only a single variable is added to the model (e.g., business risk), the t-statistic on that variable's coefficient is equivalent to the partial F-test statistic (i.e., $t^2 = F$; Neter et al. 1996).

[15] In this condition, only three of the 17 subjects perceived an increase in business risk, despite the fact that they perceived a higher likelihood of a material misstatement, a factor associated with higher business risk.

TABLE 5
Additional Test of Hypothesis 1
Simple Effects of Business Risk on Audit Investment within Condition

	Dependent Variable is Change in Audit Investment[a]					
	Error Condition (n = 17)			*Irregularity Condition (n = 17)*		
Variables[c]	*Expected Sign*	*Equation (1)*[b]	*Equation (2)*[b]	*Expected Sign*	*Equation (1)*[b]	*Equation (2)*[b]
Intercept		.058	.029		1.21	−.031
		(.21)	(.10)		(1.66)	(.04)
ΔMateriality	−	.00006	.0001	−	.000006	.000004
		(.95)	(.98)		(1.38)	(1.24)
ΔInherent risk	+	0.80	.087	+	−.001	−.124
		(.544)	(.58)		(−.002)	(−.67)
ΔControl risk	+	.436	.418	+	.551	.244
		(2.98)**	(2.73)**		(2.32)*	(1.02)
ΔBusiness Risk	+		.228	+		.555
			(.58)			(2.44)*
Adjusted R^2		.364	.330		.254	.460
F-statistic (p-value)		4.06	2.97		2.81	4.40
		(.015)	(.032)		(.040)	(.010)

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*, ** Significant at .05 and .01 levels in one-tailed tests, respectively.

[a] The table reports regression coefficients with t-statistics in parentheses.

[b] Independent variables in equation (1) include only changes in elements of the audit risk model (excluding acceptable audit risk) whereas equation (2) also includes changes in business risk. All variables are defined in table 2.

[c] Δ indicates that the variable represents a subject's assessment after the discovery of the misstatement less the assessment taken before the discovery.

reflects only the increased audit investment; the audit fee does not contain a risk premium. In the irregularity condition, business risk is highly significant ($p = .004$), even in the presence of a significant audit investment ($p < .05$). The portion of the fee caused by the additional business risk can be interpreted as a risk (or insurance) premium to cover business risk that cannot be controlled by the increased level of auditing. The size of the coefficient on business risk in the irregularity condition suggests that the risk premium dominates the additional cost of the audit investment when determining the audit fee. These results support H2, suggesting that auditors perceive that they can (cannot) adequately control the risks introduced by an error (irregularity) by increasing the audit investment.

Professional standards provide little guidance about client acceptance decisions. However, SAS No. 82 (AICPA 1997b) states that auditors should consider withdrawing from engagements when the risk of irregularities is significant. We addressed the possibility that the risk premium in the irregularity condition was due to subjects who would have rejected the client, but were unable to do so in the context of the experiment, by posing the following question: "How strongly would you agree or disagree with a decision to pursue the Corporation as an audit client?" (1 = Agree strongly to 11 = Disagree strongly). First, we

TABLE 6
Additional Test of Hypothesis 2
Simple Effects of Business Risk on Audit Fee within Condition

	Dependent Variable is Change in Audit Fee			
	Error Condition[a] *(n = 17)*		*Irregularity Condition*[a] *(n = 17)*	
Variables[b]	*Expected Sign*	*Coefficient (t-statistic)*	*Expected Sign*	*Coefficient (t-statistic)*
Intercept		.447 (2.48)*		.475 (1.17)
Δ Audit Investment	+	.598 (4.09)**	+	.243 (1.78)*
Δ Business Risk	+	−.167 (−1.22)	+	.421 (3.44)**
Adjusted R^2		.508		.738
F-statistic (p-value)		9.26 (.001)		23.55 (<.0001)

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*, ** Significant at .05 and .01 levels in one-tailed tests, respectively.

[a] Results for both regressions are substantively the same if elements of the ARM are added to the equations. That is, in the error condition, the increase in the audit investment is the only significant explanatory variable, again implying the absence of a risk premium in this condition. In the irregularity condition, the coefficient on business risk remains highly significant ($p < .001$), none of the coefficients on elements of the ARM are significant, and the overall explanatory power of the model is virtually the same as that reported above. In other words, the risk premium is attributable to business risk rather than some element of audit risk not reflected in the additional audit investment.

[b] Δ indicates that the variable represents a subject's assessment after the discovery of the misstatement less the assessment taken before the discovery.

included the responses to this question as a control variable in the regression for the irregularity condition reported in table 6. The coefficient on this variable was not significant ($p = .31$), while the coefficients on business risk and the audit investment were qualitatively the same as those reported in table 6. In addition, we conducted the analysis in table 6 after omitting subjects who were strongly against pursuing the client (i.e., eight subjects with responses of 8 or above). Again, the results were unaffected by this analysis—the coefficient on business risk was still positive and significant ($p = .014$). These results suggest that the risk premium is not attributable to subjects who might have rejected the client. Similarly, auditors participating in pilot testing of the case indicated that they would continue to pursue the client in the irregularity condition, which was intended to represent an irregularity, but not one so severe that the auditors would not pursue the client.

V. DISCUSSION, IMPLICATIONS AND FUTURE RESEARCH

This study examined the conditions under which (1) business risk provides explanatory power above that provided by the ARM in explaining planned audit investments and (2) audit fees contain risk premiums. The results indicate that, in the presence of an error, the ARM dominates business risk in the explanation of the planned audit investment, and the fee does not contain a risk premium. In the presence of an irregularity, business risk dominates the ARM in the explanation of the planned audit investment, and the fee contains a risk premium. These findings suggest that the ARM, as a professional standard, provides useful guidance when the risk of errors is high, but not when the risk of irregularities is high. It appears that business risk encompasses risks that extend beyond those captured by the ARM, and in the presence of irregularities auditors react to and price these risks.

These findings are consistent with Shibano (1990), who argued that the decision-theoretic framework underlying the audit-risk model is formulated effectively for errors, but not irregularities. Further, the business risk associated with irregularities cannot be effectively managed by altering the elements of the ARM because irregularities involve potential costs beyond those associated with the probability of undetected material misstatements. With respect to audit fees, it appears that in the presence of irregularities, normal audit procedures cannot control all related risks. Consequently, auditors charge additional fees to compensate them for the uncontrolled risks.

An important implication of these results is that the discovery of irregularities leads auditors to consider a wider range of issues than those encompassed by SAS No. 47. Apparently, this key professional standard is offering incomplete guidance to auditors in certain situations where they face high levels of business risk. Perhaps audit standards should be revised to address more explicitly how irregularities (and business risk) should be reflected in the elements of the ARM, audit investments and audit fees. Huss and Jacobs (1991) and Cushing and Loebbecke (1983) already have suggested that SAS No. 47 be revised to reflect a more comprehensive set of risks.

SAS No. 82, which establishes fraud risk assessments, may help to address the apparent limitations in SAS No. 47, but the relationship between the fraud risk assessment and the ARM, as described in SAS No. 47, is unclear. Further, SAS No. 82 does not address how the risk of irregularities should affect the pricing of audit services. The concept of engagement risk (e.g., Huss et al. 1993) also may be useful because it formalizes how auditors should recognize and incorporate into their planning decisions all the risks existing in the current audit environment. In any case, auditors should consider developing standards designed to assess and manage risks beyond those encompassed by the ARM, and establish risk premiums that compensate them for bearing the costs associated with the different dimensions of business risk.

While our results suggest that professional standards should be reviewed, it is also possible that auditors are not fully utilizing the ARM. We show evidence, consistent with previous research, that audit firm policies may be constraining auditors from setting audit risk at low enough levels to adequately respond to irregularities. Recall in our experiment that acceptable audit risk judgments were insensitive to the discovery of both the error and the irregularity, and approximately half of the sample set audit risk at 5 percent. Such constraints could render the ARM less descriptive, a question that could be addressed by future research.

In this study we showed that irregularities—not errors—led to risk premiums in the audit fee. However, irregularities also led to higher levels of business risk, so it is difficult to disentangle the effect of the irregularities from that of increased business risk.[16] Perhaps risk premiums depend on the level of business risk, independent of its source. To address this possibility, future research could consider other sources of risk and examine whether auditors control these risks through increased audit investment and/or risk premiums. For example, clients as takeover candidates and those experiencing financial difficulties both introduce additional and different kinds of risks to the auditor. These risks may have different implications for the descriptive ability of the ARM and the pricing of audit services. Addressing such questions should promote a better understanding of the economic role of the audit in an environment where the scope of auditor responsibility appears to be expanding.

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[16] Errors generally pose lower business risk than irregularities because lawsuits associated with errors are more likely to be dismissed and result in lower settlements (Palmrose 1987, 100). Lawsuits involving irregularities perpetrated by management are "most frequently resolved through payment of damages by auditors, and are the primary type of cases with large auditor payments" (Palmrose 1987, 102). Irregularities also increase business risk because of the possibility that auditors will suffer losses associated with lawsuits even if the auditor conducts an audit in accordance with GAAS (Palmrose 1987, 91), if financial statement users suffer losses because of the irregularities.

REFERENCES

American Institute of Certified Public Accountants (AICPA). 1997a. *Audit Risk and Materiality in Conducting an Audit.* Statement on Auditing Standars No. 47. New York, NY: AICPA.

———. 1997b. *Consideration of Fraud in a Financial Statement Audit.* Statement on Auditing Standards No. 82. New York, NY: AICPA.

Arens, A. A., and J. K. Loebbecke. 1997. *Auditing: An Integrated Approach.* Englewood Cliffs, NJ: Prentice Hall.

Bedard, J. C. 1989. An archival investigation of audit program planning. *Auditing: A Journal of Practice & Theory* 9 (Spring): 57–71.

Brumfield, C. A., R. K. Elliott, and P. D. Jacobson. 1983. Business risk and the audit process. *Journal of Accountancy* (April): 60–68.

Cushing, B. E., and J. K. Loebbecke. 1983. Analytical approaches to audit risk: A survey and analysis. *Auditing: A Journal of Practice & Theory* 3 (1): 23–41.

———, L. E. Graham, Jr., Z-V. Palmrose, R. S. Roussey, and I. Solomon. 1995. Risk orientation. In: *Auditing Practice, Research, and Education: A Productive Collaboration*, edited by T. B. Bell, and A. M. Wright. New York, NY: AICPA.

Daniel, S. J. 1988. Some empirical evidence about the assessment of audit risk in practice. *Auditing: A Journal of Practice & Theory* 7 (Spring): 174–181.

Gaumnitz, B. R., T. R. Nunamaker, J. J. Surdick, and M. F. Thomas. 1982. Auditor consensus in internal control evaluation and audit program planning. *Journal of Accounting Research* 20 (Autumn), Part II: 745–755.

Graham, L. E. 1985. Audit risk—Part IV. *The CPA Journal* (November): 38–45.

Greene, W. H. 1990. *Econometric Analysis.* New York, NY: Macmillan Publishing Company.

Hackenbrack, K., and W. R. Knechel. 1997. Resource allocation decisions in audit engagements. *Contemporary Accounting Research* 14 (Fall): 481–499.

Hoffman, V. B. 1997. Discussion of: The effects of SAS No. 82 on auditors' attention to fraud risk factors and audit planning decisions. *Journal of Accounting Research* 35 (Supplement): 99–104.

Huss, H. F., and F. A. Jacobs. 1991. Risk containment: Exploring auditor decisions in the engagement process. *Auditing: A Journal of Practice & Theory* 10 (Fall): 16–32.

———, F. A. Jacobs, and D. M. Patterson. 1993. Managing risk in public accounting firms. *Risk Management* (September): 51–60.

Janell, P., and A. Wright. 1991. Inherent risk and control environment assessment practices of major auditing firms: The state of the art. Working paper, Northeastern University, Boston, MA.

Jiambalvo, J., and W. S. Waller. 1984. Decomposition and assessments of audit risk. *Auditing: A Journal of Practice & Theory* 3 (Spring): 80–88.

Joyce, E. J. 1976. Expert judgment in audit program planning. *Journal of Accounting Research* (Supplement): 29–60.

Kaplan, S. E. 1985. An examination of the effects of environment and explicit internal control evaluation on planned audit hours. *Auditing: A Journal of Practice & Theory* 5 (1): 12–25.

Knechel, W. R. 1998. *Auditing.* Cincinnati, OH: South-Western Publishing Company.

Libby, R., J. T. Artman, and J. J. Willingham. 1985. Process susceptibility, control risk, and audit planning. *The Accounting Review* 60 (April): 212–230.

Martinov, N., and P. Roebuck. 1998. The assessment and integration of materiality and inherent risk: An analysis of major firms' audit practices. *International Journal of Auditing* 2 (2): 103–126.

Menon, K., and D. D. Williams. 1994. The insurance hypothesis and market prices. *The Accounting Review* 69 (April): 327–342.

Messier, W. F. 1997. *Auditing: A Systematic Approach.* New York, NY: The McGraw-Hill Companies, Inc.

Mock, T. J., and A. Wright. 1993. An exploratory study of auditors' evidential planning judgments. *Auditing: A Journal of Practice & Theory* 12 (2): 39–61.

Neter, J., M. H. Kutner, C. J. Nachtsheim, and W. Wasserman. 1996. *Applied Linear Statistical Models.* Chicago, IL: Richard D. Irwin, Inc.

O'Keefe, T. B., D. A. Simunic, and M. T. Stein. 1994. The production of audit services: Evidence from a major public accounting firm. *Journal of Accounting Research* 32 (Autumn): 241–261.

Palmrose, Z-V. 1987. Litigation and independent auditors: The role of business failures and management fraud. *Auditing: A Journal of Practice & Theory* 6 (Spring): 90–103.

Pratt, J., and J. D. Stice. 1994. The effects of client characteristics on auditor litigation risk judgments, required audit evidence, and recommended audit fees. *The Accounting Review* 69 (October): 639–656.

Ricchiute, D. N. 1998. *Auditing and Assurance Services.* Cincinnati, OH: South-Western Publishing Company.

Shibano, T. 1990. Assessing audit risk from errors and irregularities. *Journal of Accounting Research* 28 (Supplement): 110–140.

Simunic, D. 1980. The pricing of audit services: Theory and evidence. *Journal of Accounting Research* 18 (Spring): 161–190.

———, and M. T. Stein. 1996. The impact of litigation risk on audit pricing: A review of the economics and the evidence. *Auditing: A Journal of Practice & Theory* 15 (Supplement): 119–134.

Stice, J. D. 1991. Using financial and market information to identify pre-engagement factors associated with lawsuits against auditors. *The Accounting Review* 66 (3): 516–533.

Walo, J. C. 1995. The effects of auditor's business risk on audit scope. *Auditing: A Journal of Practice & Theory* 14 (1): 115–124.

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The Influence of Client Preferences on Tax Professionals' Search for Judicial Precedents, Subsequent Judgments and Recommendations

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ABSTRACT: Tax professionals provide valuable services to clients by reducing uncertainty about how clients should report transactions on their tax returns. To reduce uncertainty, tax professionals research applicable authorities (e.g., judicial precedents) and provide assessments to clients of the level of authoritative support for client-favorable positions. Tax professionals have strong incentives to make accurate assessments of the strength of client-preferred positions so that clients will understand the level of risk associated with the reporting position. Further, tax professionals must make accurate assessments of authoritative support in order to maintain compliance with tax professional standards and Federal income tax regulations. Incentives notwithstanding, psychological research on confirmation bias suggests that tax professionals' client advocacy role may inhibit professionals' ability to search objectively for relevant tax authority which, in turn, might inhibit their ability to accurately assess authoritative support. We report the results of two studies that examine causes and effects of confirmation bias in tax information search. In study 1, we find that subjects' information searches emphasized cases with conclusions consistent with the client's desired outcome (i.e., positive cases) over cases inconsistent with the client's desired outcome (i.e., negative cases), despite the fact that positive cases were no more similar to the client's facts.

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Additional analyses indicate that the extent of this confirmation bias was positively related to their assessments of the likelihood that a neutral court would resolve the issue in the client's favor and this in turn increased the strength with which they recommended the client's preferred tax position. Results of study 2 indicate that confirmation bias induced by client preferences can be strong enough to not only result in inaccurate assessments of authoritative support for the client-favored position, which is problematic in and of itself, but also to lead tax professionals to make overly aggressive recommendations.

Key Words: *Information search, Client advocacy, Confirmation bias, Tax research.*

Data Availability: *Data are available from the authors.*

I. INTRODUCTION

A generally accepted view in the accounting literature is that tax professionals provide valuable services to clients by reducing uncertainty with respect to the manner in which transactions should be reflected on clients' tax returns (Phillips and Sansing 1998; Roberts 1998; Beck et al. 1996; Shields et al. 1995; Beck and Jung 1989). Tax professionals reduce uncertainty by researching applicable authorities (e.g., judicial precedents) in order to determine the level of authoritative support for alternative tax treatments, which is typically expressed as the likelihood a tax treatment will be sustained on its merits. Professional tax standards (AICPA 1994, 18,055–18,059), federal income tax regulations and analytical models of professional tax services (e.g., Phillips and Sansing 1998; Beck et al. 1996) assume that tax professionals are able to make unbiased assessments of the strength of tax-reporting positions. However, prior psychological research suggests tax professionals' role as client advocate may inhibit their ability to search objectively for relevant tax authority, due to a general decision-maker tendency to place relatively more emphasis on information consistent with the desired outcome when conducting the information search (Koehler 1991). This "confirmation bias" may cause tax professionals to overestimate the level of support for the client's desired position, which may ultimately lead to overly aggressive recommendations.

The primary purposes of this paper are to examine whether tax professionals searching judicial precedents for authority to resolve client issues (1) exhibit confirmation bias in their information search behavior and (2) whether confirmation bias inhibits their ability to reach accurate assessments of the strength of client-favorable reporting positions. A secondary purpose is to examine the extent to which tax professionals' search behavior and assessments of strength of client-favorable reporting positions affect tax professionals' recommendations to clients.

Using a computerized information search instrument, we conducted two studies. In both studies tax professionals from Big 5 firms searched for judicial precedents to resolve a client's tax issue. In the first study, client preferences were manipulated between subjects such that different subject groups preferred different tax treatments. We predicted and found that subjects spent more time viewing cases with conclusions consistent with the client's desired outcome (i.e., positive cases) than cases inconsistent with the client's desired outcome (i.e., negative cases). In addition, path analysis revealed that the extent of this confirmation bias was positively related to their assessments of the likelihood that a neutral court would resolve the issue in the client's favor; and this in turn increased the strength with which they recommended the client's preferred tax position.

In the second study, we altered the client facts such that the client's preferred tax position could not be supported. Results indicate that approximately one-half of the subjects recommended the client-preferred position, despite the fact that a panel of experts determined that the client-preferred position in study 2 stood only a 14 percent chance of being supported by the courts if litigated. This level of support is substantially below the minimum threshold required by professional standards for recommending the position. The data also show that the information search behaviors of subjects who made incorrect recommendations were significantly biased toward positive cases, even though the positive case facts were not as similar to the client's facts as were the negative case facts. In contrast, subjects who made correct recommendations placed relatively more emphasis on negative cases which had greater similarities to the client's fact pattern. Thus, the results of the second study suggest that information search biases induced by client preferences can be strong enough to not only result in inaccurate assessments of authoritative support for the client-favored position, which is problematic in and of itself, but also to lead tax professionals to make overly aggressive recommendations.

The potential problems created by confirmation bias in tax research tasks are likely to adversely affect three groups. First, taxpayers are concerned about the risks associated with tax-minimizing positions and expect their paid tax professionals to provide them with accurate assessments of these risks so that they can make fully informed reporting decisions. Second, taxing authorities stand to collect less tax revenue than the law requires when taxpayers claim overly aggressive reporting positions. To protect against this revenue loss, federal income tax law provides for penalties when tax positions are taken (and discovered by the IRS) that do not meet certain likelihood thresholds of being successfully defended on their merits. Because not all such positions can be discovered by the IRS, the equitable implementation of our voluntary income-tax-reporting system is compromised to the extent that tax professionals systematically overestimate the likelihood of defending tax-minimizing positions. Finally, tax professionals should be concerned about the potential for confirmation bias to influence their recommendations because of the potential for preparer penalties imposed by the taxing authorities, other professional sanctions and resulting reputation effects which could adversely affect their client base.

This paper provides initial evidence that when information search is required to resolve issues, tax professionals may have difficulty accurately assessing the authoritative support for client-preferred tax positions. It also provides evidence that biased search behavior can result in tax professionals making overly aggressive and mistaken recommendations. Because information search determines the information that will ultimately be evaluated, insights on the effects of client preferences on tax professionals' information search represent an important contribution beyond current research that examines the effect of client advocacy on tax professionals' information evaluation (Johnson 1993; Cuccia et al. 1995). We also extend research examining factors affecting tax professionals' information search performance (Spilker 1995; Cloyd 1997). This study should be of interest to tax practitioners who must recommend reporting positions to clients, tax educators who teach tax research methodology, academics who study professional judgment and decision making, and policy makers who prescribe standards for tax professional judgments.

Although we address these issues in a tax setting, issues of client advocacy have been raised recently in financial accounting and auditing settings (POB 1994; Schuetze 1994; Hackenbrack and Nelson 1996; Salterio and Koonce 1997). Like tax professionals, auditors are often called on to assess the defensibility of client-preferred financial accounting treatments when the appropriate treatment is ambiguous (Salterio 1996). Thus, the issues addressed in this study are also relevant to financial accounting and auditing settings.

The remainder of this paper is organized as follows. The next section provides background and develops hypotheses. The third section describes the research method and presents results from the first study; the fourth section describes and discusses the second study. The final section summarizes and concludes the paper.

II. BACKGROUND AND HYPOTHESES

Background

Tax professionals attempt to resolve uncertainty about how tax rules apply to client facts by conducting research. However, this research does not always eliminate uncertainty about whether the client-favored tax position can be successfully defended if challenged. In these situations, a key purpose of the tax research task is to generate an accurate assessment of the probability that the desired tax treatment would be supported on its merits if litigated. This probability assessment is important for at least three reasons.

First, tax professionals need to convey accurately the strength of tax positions to clients so clients can make informed tax-reporting decisions. Without an understanding of the level of aggressiveness involved in a tax position, the client may adopt a position and unknowingly assume more risk than desired. Prior research suggests that clients are much less tolerant of risks associated with aggressive tax positions than are their tax preparers (Christensen 1992). For example, in a survey reported by Hite et al. (1992, 22), 300 small business owners indicated that they would require, on average, a 70 percent likelihood of success before claiming a tax deduction about which the tax law was ambiguous—a comfort level that is considerably higher than the minimum necessary for taxpayers and tax preparers to avoid penalties.

Second, the government expects tax professionals to assess accurately the strength of tax positions and imposes financial penalties on taxpayers and tax professionals when overly aggressive tax positions are claimed. Taxpayers are subject to an accuracy-related penalty when positions taken on their tax returns lack "substantial authority" (IRC §6662).[1] Tax return preparers are subject to penalties when a tax position claimed on a return they prepare does not have a "realistic possibility" of success, defined as a "one-in-three, or greater, likelihood of being sustained on its merits" [Treas. Reg. §1.6694-2(b)(1)]. Importantly, federal tax regulations require that such likelihood judgments be based on a "reasonable and well-informed analysis" [Treas. Reg. §1.6694-2(b)(1)] of all relevant tax authorities, "including the authorities contrary to" the preferred treatment [Treas. Reg. §1.6662-4(d)(3)(i)].

Finally, professional standards state that CPAs should not recommend tax positions unless they have a "good faith belief that the position has a realistic possibility of being sustained administratively or judicially on its merits if challenged" (AICPA 1988, 4).[2] Although tax professionals are required by professional standards to act as client advocates with respect to the tax positions they recommend, these standards presume that this advocacy role will not affect the CPA's ability to assess accurately the defensibility of the client's preferred position.

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[1] The taxpayer penalty for positions that lack "substantial authority" is 20 percent of the amount by which taxable income is understated (IRC §6662). This penalty may be avoided if the tax position and facts underlying the position are explicitly disclosed in the tax return. Although the regulations do not provide a numeric definition of "substantial authority," they state that this standard is "less stringent than the more likely than not standard" (i.e., 50 percent likelihood of the position being upheld), but "more stringent than the reasonable basis standard" [Treas. Reg. §1.6694-4(d)(2)]. Raabe et al. (1994, 363) equate the reasonable basis standard to a 25 percent likelihood of being upheld in court.

Developing an accurate probability assessment requires that the tax professional conduct tax research in a fashion that will avoid bias. The avoidance of bias is a primary reason that instructional books on tax research techniques emphasize the importance of screening potentially relevant precedents (e.g., court cases) on the basis of similarities or dissimilarities between the facts of the precedent and the client's fact pattern, rather than on the basis of case outcomes (Gardner and Stewart 1993, 148–153; Raabe et al. 1994, 271). Similarly, as noted above, professional standards and Treasury regulations require that likelihood assessments be based on well-informed analyses of all relevant authorities, including those *contrary* to the desired tax position. In the following section we explain why tax professionals may have difficulty accurately assessing the support for client-favorable positions.

Prior Research

A consistent finding in psychological research is that people tend to evaluate evidence that is consistent with a previously held belief as more relevant than evidence that is contrary to that belief (see e.g., Snyder and Swann 1978; Lord et al. 1979). Perhaps because consistent evidence is viewed as more relevant, people tend to seek out such evidence when searching for information to test a hypothesis. This phenomenon is known as "confirmation bias" (Nisbett and Ross 1980, 181).

Koehler (1991, 502) argues that confirmation bias will occur even when the hypothesis being tested was not previously viewed as true by the decision maker. Rather, he argues that any task which requires a person to explain why a focal hypothesis might be true causes the person to adopt a conditional reference frame in which the focal hypothesis is temporarily accepted as true. The person then evaluates and reorganizes all relevant information within this conditional reference frame. Information that is consistent with the way in which other relevant evidence has been organized (i.e., the conditional reference frame) tends to be more comprehensible and viewed as more relevant. As a result, consistent information is more likely to be retrieved during information search and more easily recalled after information search. Inconsistent information, on the other hand, is more difficult to comprehend and is likely to be discounted or ignored during information search.

Because tax professionals' are client advocates (AICPA 1988, 5), it is appropriate for them to focus on the goal of achieving client-favorable reporting positions for client transactions, within the constraints of professional standards and Treasury regulations. However, this focus may inhibit their ability to evaluate objectively the strength of client-favorable positions. Johnson (1993) addresses the issue of whether tax professionals evaluate judicial evidence in a manner that supports the client's preferred treatment. In that study, subjects were presented with four court cases to use in resolving an ambiguous client issue. While the facts in all four cases remained constant, the outcome was manipulated such that for one group of subjects, two cases reached a conclusion consistent with the client's desired position, and two reached contrary conclusions. For the other group, the outcome of each case was reversed. Subjects were asked to assess the relevance of each case to the client's issue. Johnson (1993) found that subjects tended to rate cases with outcomes consistent with the client's preferred position as more relevant than cases with inconsistent outcomes. Johnson (1993) also reports that subjects' tendencies to use these confirmatory processes led to higher assessments of the likelihood that courts would support the client's position if litigated.

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[2] The "realistic possibility" standard used by the AICPA is similar to that defined in Treas. Reg. §1.6694-2(b)(1) in that it is more stringent than the "reasonable basis" standard (used prior to the Revenue Reconciliation Act of 1989) and less stringent than the "substantial authority" standard of IRC §6662. However, unlike the Treasury regulations, the AICPA's Interpretation of Statement No. 1 explicitly states that this standard "cannot be expressed in terms of percentage odds."

Although Johnson (1993) provides insights into how tax professionals evaluate judicial precedents, it omits information search, which is an important component of the decision-making process (Einhorn and Hogarth 1981). Because information search may mitigate or exacerbate biases in evaluating information (Cuccia and McGill 1998), research findings on how professionals evaluate a given set of information and how evaluations ultimately impact judgments do not necessarily apply to common situations in which professionals search for information before making recommendations. Because tax professionals in the current study are allowed to search for authority to resolve an ambiguous tax issue, we are able to examine search processes and how these processes directly affect tax professionals' assessments of the likelihood of judicial success and, through the likelihood assessments, indirectly affect their recommendations to clients.

Hypotheses

Although tax professionals should do what they can (within limits) to resolve issues in their client's favor, it is, as discussed above, important that they search for and evaluate precedents on the basis of factual similarities between the client's facts and the facts in the judicial precedents. However, prior research suggests that professionals will tend to search for precedents on the basis of outcomes rather than facts. This idea is summarized in our first hypothesis:

> **H1:** During a search for judicial precedents to resolve a tax issue, subjects will devote a greater percentage of their search activity to cases in which the court's conclusion is consistent with the client's desired tax treatment than to cases in which it is not.

Prior research shows that elaboration on information supporting a particular hypothesis is likely to increase a professional's assessment that the hypothesis is true (Koehler 1991). Consistent with this idea, we hypothesize that the information tax professionals locate and attend to during information search is likely to influence their beliefs about the appropriate resolution of issues. That is, the more tax professionals emphasize positive precedents over negative precedents during information search, the more they are likely to believe that the client's preferred treatment is supported by relevant authority. This indirect effect is the result of client preferences that influence professionals' search emphasis on positive precedents which, in turn, influences their assessments of the likelihood of judicial success for the client's preferred position. This positive indirect effect of client preferences on tax professionals' court assessments is presented in our second hypothesis:

> **H2:** By influencing the type of information subjects attend to during information search, client preferences will have a positive indirect effect on subjects' assessments of the likelihood of judicial success for the client's preferred tax position.

As described above, AICPA standards indicate that tax professionals should be advocates for their clients when making recommendations. In addition to affecting tax professionals' recommendations directly in the manner anticipated by professional standards, we expect that due to their influence on information search, client preferences will affect recommendations indirectly in a manner not anticipated by these standards. The rationale for this indirect effect is that the greater the perceived authoritative support for a client's preferred tax position, all else equal, the more likely the professional is to recommend the position. This indirect effect of client preferences on tax professionals' recommendations is formalized in our third hypothesis:

> **H3:** By influencing the type of information subjects attend to during information search and subjects' assessments of the likelihood of judicial success for the client's preferred position, client preferences will have a positive, indirect effect on the strength with which subjects recommend the client's preferred tax position.

Figure 1 diagrams expected relations among variables examined in study 1. Hypothesis 1 corresponds to link 1, H2 corresponds to links 1 and 2, and H3 corresponds to links 1, 2 and 3. The direct effect of client advocacy on tax professionals' recommendations is illustrated in figure 1 by link 4, which connects client preferences and the strength of recommended tax position.

III. STUDY 1

Method

Overview

In an experimental setting, subjects searched a computerized database of court cases to determine whether a client should be treated as an investor or a dealer with respect to a real estate sale. Client preferences were manipulated by telling subjects the client recognized either a gain or a loss on the sale of certain real estate. Because of tax consequences described later in this section, the client preferred to be treated as an investor in the gain case and as a dealer in the loss case. Subjects were given the objective of saving to an electronic notebook all cases they would cite in a memorandum that addresses their position on the investor vs. dealer issue.[3]

Subjects

Seventy-two Big 5 tax professionals participated in study 1. Data for one subject was lost due to a computer malfunction. For the remaining 71 subjects, the average length of employment as a tax professional was 31.4 months (s.d. = 15.6 months). Tax professionals with one to four years of experience were targeted for this study because they do a significant amount of initial research on issues. Subjects reported that, on average, 26.2 percent (s.d. = 22.3 percent) of their chargeable time was devoted to tax research tasks, and 9.2 percent (s.d. = 20.6 percent) of their chargeable time was devoted to work in the real estate industry. Forty-one subjects (58 percent) possessed a master's degree in accounting or tax, five (7 percent) had law degrees, and 25 (35 percent) had bachelor's degrees only. Five subjects responded incorrectly to at least one manipulation check question. These subjects are excluded from the reported analyses, resulting in a final sample of 66 subjects.[4]

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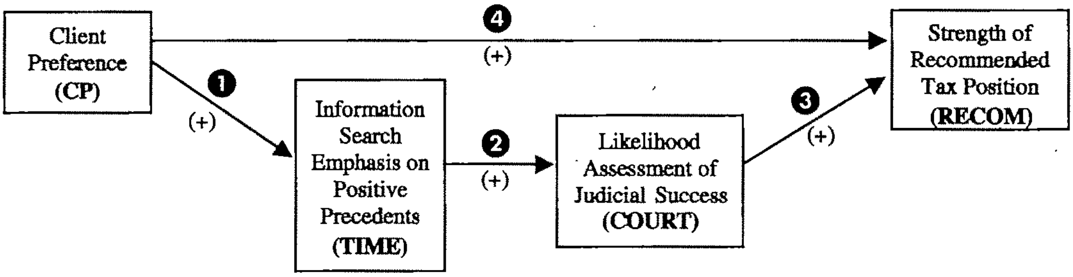
[3] The probability of an IRS audit was also manipulated between-subjects at two levels (less than 5 percent and greater than 50 percent). We reasoned that a greater likelihood of IRS scrutiny might mitigate the effect of client preferences on subjects' relative search emphasis on positive precedents. Although subjects' responses to a manipulation check question indicated that the manipulation was successful, the probability of audit manipulation had no significant effect on any of the dependent measures. Therefore, all reported results are collapsed across the two levels of this variable and the manipulation is not further discussed.

[4] The results are unaffected by the exclusion of these five subjects.

FIGURE 1
Hypothesized Relations Among Client Preference, Information Search Emphasis, Likelihood Assessments of Judicial Success and Strength of Recommended Tax Positions[a]


Client Preference (CP)
❶
(+)
Information Search Emphasis on Positive Precedents (TIME)
❷
(+)
Likelihood Assessment of Judicial Success (COURT)
❸
(+)
❹
(+)
Strength of Recommended Tax Position (RECOM)

Link 1 is the relation between client preferences and information search emphasis hypothesized in H1. Conceptually, information search emphasis refers to the relative amount of attention paid to information of a particular type. For purposes of this study, information search emphasis is primarily measured by the relative amount of time spent viewing information from court cases with a particular outcome. The positive sign indicates that tax professionals will place more emphasis on precedents with outcomes consistent with client preferences (positive precedents) than on precedents with outcomes inconsistent with client preferences (negative precedents).

Link 2 is the expected relation between information search emphasis and the assessed likelihood of judicial success for the client's preferred position. The positive sign indicates the expectation that the more tax professionals emphasize positive precedents during information search, the more likely they are to perceive the client's preferred position will be upheld.

Link 3 is the expected relation between the assessed likelihood of judicial success for the client-preferred position and the strength with which professionals recommend the client-preferred position. The positive sign indicates that as the likelihood of judicial success increases, professionals are expected to more strongly recommend the client-preferred tax position.

Link 4 is the expected relation between client preferences and the strength with which professionals recommend the client-preferred tax position. The positive sign indicates that professionals are expected to more strongly recommend client-preferred positions than positions the client does not prefer, irrespective of information search.

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[a] Bolded letters in parentheses represent abbreviations for variables.

Procedures

All phases of the experiment were incorporated into a computer program specifically designed for this study. On starting the program, subjects responded to questions about the nature and extent of their tax experience and then worked through a training module designed to familiarize them with the search software. The training module required subjects to use the same buttons and options available in the information search task, but included no actual tax information. On completing the training module, subjects started the experimental case.

In the experimental case, subjects were first presented with an assignment memorandum from a tax manager (see appendix A, panel A). The assignment memo described the client as the CEO of a company and indicated that, to complete the client's income tax return, we "need to determine whether . . . [a $500,000 gain (or loss) realized by the client during the year] on sales of real estate should be treated as ordinary or capital." The memo provided an overview of both the tax issue and the relevant statutory authority (i.e., IRC §1221(1)). The assignment memo specified that "your task objective is to save in your notebook all cases you would cite in a memo addressing your position on the research issue." After reading the assignment memo but before beginning their search, subjects were reminded of their objective and asked to confirm that they understood the objective.

Subjects were then told that the actual exercise was about to begin and that their search time would be limited to 30 minutes.[5] A time limit was imposed so that subjects would have to make choices of how to spend their search time as they do in practice. During the search time, subjects could review (1) the assignment memorandum, (2) a summary of four factors considered by the courts as indicative of dealer vs. investor status (see appendix A, panel B), (3) the client's facts (see appendix A, panel C) and (4) a database of 24 court cases. Subjects were allowed to end their search at any time.

The client facts presented a situation in which a taxpayer purchased real estate originally for investment purposes, but later subdivided and developed the land into residential lots in order to facilitate its disposition. To facilitate the client-preference manipulation, the fact pattern used in study 1 was purposely ambiguous with respect to whether the client should be considered an investor or a dealer. Factors suggesting investor status include the original purpose in acquiring the property, lack of prior real estate activity and a single sale of most of the developed lots. Factors suggesting dealer status include the extent of the client's rezoning, development and sales activities.

The database consisted of 24 relevant cases abstracted from actual court cases.[6] The court cases were organized by tax factor, with six cases listed under each of the four factors courts have used to decide prior cases. Under each factor, half of the cases were cases in which the courts had ruled that the taxpayer was an investor (i.e., investor cases); the other half were cases in which the courts had ruled that the taxpayer was a dealer (i.e., dealer cases). Within a particular case, on-screen buttons allowed subjects to view the issue, facts, conclusion and the court's analysis of the case. On-screen buttons also allowed subjects to save the case to a notebook, view the notebook contents and remove cases previously saved in the notebook.

On concluding their search, participants provided an assessment of how the courts would rule on their client's case and then indicated the strength with which they would recommend the client's preferred tax treatment. Subjects then completed a series of background questions.

Client Preference Manipulation

The tax treatment preferred by the client was manipulated between-subjects with participants randomly assigned to either the "dealer" condition or the "investor" condition. The information presented to subjects in each condition was the same except for the following. First, in the assignment memorandum and client facts (see appendix A, panels A and C), subjects in the dealer condition were told that the client had sold certain real estate at a $500,000 loss, while subjects in the investor condition were told that the client had sold the real estate at a $500,000 gain.[7] Second, in the assignment memorandum (see appendix A, panel A), subjects in the dealer condition were told the client "would prefer to be treated as a dealer so that he can deduct all of his loss against other ordinary income," while subjects in the investor condition were told that the client "would prefer to be treated as an investor so that his gain will be taxed at the lower, alternative rate for long-term capital gains" (i.e., 28 percent).[8] All subjects were told that the client's marginal tax rate on ordinary income was 39.6 percent (the top marginal tax rate).

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[5] As subjects searched the database, an on-screen clock displayed the remaining search time. If time expired while a subject was still searching the database, the subject was informed that the time had expired and that they would begin the post-search phase of the program. As reported in footnote 11, most subjects used nearly all of the allotted time.

[6] All 24 cases were relevant in the sense that they dealt with the issue of whether a taxpayer was a dealer or an investor. In order to control for the influence of other factors on information search, case information pertaining to dollar amounts, dates, and court identity was not included.

To verify that subjects attended to the client preference manipulation, two manipulation check questions were included in the post-experimental questionnaire. As noted above, the five subjects who responded incorrectly to at least one of these questions are excluded from the reported analyses.

Dependent Variables

TIME is a standardized measure of subjects' relative search emphasis on positive vs. negative cases. This variable represents the amount of time spent viewing investor cases *minus* the amount of time spent viewing dealer cases, divided by the total time spent viewing all cases. A positive value for TIME implies a relative emphasis on investor cases and a negative value implies a relative emphasis on dealer cases.

Other dependent measures are COURT and RECOM. COURT represents subjects' assessments of the probability that the courts would rule the client was an investor if the case went to trial.[9] The scale ranges from 0 percent to 100 percent in 1 percent increments. A response of 0 percent on this scale implies a probability of 100 percent that the courts would rule that the client was a dealer. RECOM represents the strength with which subjects recommended the client take a particular tax position on the client's tax return and ranges from −3 ("strongly recommend dealer") to +3 ("strongly recommend investor").[10]

Results

Descriptive Statistics

Table 1 provides descriptive statistics, by client preference condition, on the types of case information subjects viewed as they searched for judicial precedents. As table 1 indicates, subjects in the dealer-preferred condition looked at an average of 25.97 dealer-case components and 17.81 investor-case components. In contrast, subjects in the investor-preferred condition viewed an average of 15.50 dealer-case components and 26.33 investor-case components. Since there were a total of 48 investor-case components and 48 dealer-case components, these results indicate that subjects looked at considerably less than the total information available in the database. The average number of cases viewed per subject provides further insight into the breadth of subjects' searches. On average, subjects in the dealer-preferred condition viewed 8.16 (out of 12) investor cases and 10.91 (out of

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[7] The difference between the loss and the gain conditions was solely due to a difference in the initial purchase price of the land. Subjects in the loss (i.e., dealer) condition were told that the client initially purchased the property for $2.3 million, while subjects in the gain (i.e., investor) condition were told that the client initially purchased the property for $1.3 million.

[8] Both studies were conducted prior to the lowering of long-term capital gains tax rates by the Taxpayer Relief Act of 1997.

[9] In providing their court assessment, subjects responded to the question "Assume that your client's position on this issue is litigated. What is the probability that the courts would conclude that your client is an investor instead of a dealer?"

[10] In providing their recommendation, subjects responded to the question "Based on your research, what position would you recommend your client take on his tax return?"

TABLE 1
Study 1—Information Viewed by Client Preference Condition

	Dealer-Preferred (n = 32)		*Investor-Preferred (n = 34)*	
	Investor Cases	*Dealer Cases*	*Investor Cases*	*Dealer Cases*
Average Number of Case Components Viewed Per Subject[a]				
Case Issue	3.66	4.84	5.88	3.88
Case Facts	5.50	7.94	8.24	5.00
Conclusion	3.06	5.31	5.03	3.00
Analysis	5.59	7.88	7.18	3.62
Total	17.81	25.97	26.33	15.50
Average Number of Cases Viewed Per Subject	8.16	10.91	11.00	6.74
Average Time Spent Viewing Cases (in minutes)	7.65	12.26	13.63	6.16
Average Number of Cases Saved as Relevant[b]	1.56	3.88	4.47	1.56

[a] The database contained 12 investor cases and 12 dealer cases. Each case contained four components (i.e., case issue, case facts, conclusion and analysis). Thus, the database contained a total of 96 pieces of information related to judicial precedents.

[b] Due to a computer malfunction, data for this variable is available for only 32 subjects in the investor-preferred condition.

12) dealer cases. On average, subjects in the investor-preferred condition viewed 11 investor cases and 6.74 dealer cases. Thus, while subjects tended to view more cases with outcomes consistent with client preferences, they did not look at all available cases. Finally, table 1 indicates that the patterns of (1) average time spent viewing cases and (2) average number of cases saved (as relevant) parallel the pattern of average number of cases viewed for both client preference conditions.

Descriptive statistics for the dependent measures used to test the hypotheses are reported in table 2 for each client preference condition. Subjects in the dealer-preferred condition spent more time viewing dealer cases than investor cases and this difference represents, on average, 22.7 percent of the total time these subjects spent viewing cases (i.e., mean TIME is −0.227; see table 2). In contrast, subjects in the investor-preferred condition spent more time viewing investor than dealer cases and this difference represents, on average, 37.9 percent of the total time these subjects spent viewing cases (i.e., mean TIME is 0.379; see table 2).[11]

Table 2 also provides subjects' average court assessments (COURT). Subjects in the dealer-preferred condition provided a mean COURT assessment of 49.031, while subjects

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[11] Hypothesis 1 focuses on the relative allocation of search activity across positive and negative information when the total time available for search is limited. Seventy percent of subjects worked into the last minute of the allotted time.

TABLE 2
Study 1—Descriptive Statistics for TIME, COURT and RECOM by Client Preference Condition

	Client Preference Condition		
	Dealer (n = 32)	*Investor (n = 34)*	*Overall (n = 66)*
TIME[a]			
Mean	−0.227	0.379	0.085
Standard Deviation	0.338	0.315	0.445
COURT[b]			
Mean	49.031	66.735	58.152
Standard Deviation	25.578	23.680	26.004
RECOM[c]			
Mean	−1.063	1.177	0.091
Standard Deviation	1.605	1.660	1.975

[a] TIME is the difference in time spent viewing investor vs. dealer cases, divided by the total time spent viewing cases. A negative number represents a relative emphasis on cases with dealer outcomes.
[b] COURT is the subjective probability of judicial success indicated by subjects on a scale from 0, labeled "0 percent probability of investor," (i.e., 100 percent probability of dealer) to 100, labeled "100 percent probability of investor" (i.e., 0 percent probability of dealer).
[c] RECOM ranges from −3 ("Strongly recommend dealer") to +3 ("Strongly recommend investor").

in the investor-preferred condition provided a significantly higher average COURT assessment of 66.735 ($t = 2.92$, $p < .01$).[12] Because the client facts in both client preference conditions were identical (except for the original purchase price), the *actual* likelihood of a court finding the taxpayer is an investor (or dealer) should not vary by client preference condition. Although we purposefully created a client fact pattern for which either position had a "realistic possibility" of success, implying a value of COURT between 33 percent and 67 percent, less than 11 percent of subjects provided assessments within this range. Rather, 45 percent of the subjects in the dealer-preferred condition indicated that there was less than a one-in-three chance of *investor* treatment (i.e., COURT < 33 percent), while 74 percent of the subjects in the investor-preferred condition indicated that there was less than a one-in-three chance of *dealer* treatment (i.e., COURT > 67 percent). When interpreting the levels of the likelihood assessments, it is important to note that these assessments are inherently noisy because exact matches between the client's facts and the facts of decided court cases are rarely available (Bandy et al. 1993). However, while these assessments may be imprecise, they should not, in the absence of confirmation bias, systematically differ between client preference groups presented with the same fact pattern.

Finally, table 2 presents subjects' average recommendation scores (RECOM). Subjects in the dealer-preferred condition tended to recommend dealer treatment (mean RECOM = −1.063) while subjects in the investor-preferred condition tended to recommend investor treatment (mean RECOM = 1.177).

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[12] Consistent with the hypothesized relations between variables depicted in figure 1, CP does not have a significant direct effect on COURT after controlling for TIME. This pattern of results suggests that the client preferences affect authoritative support assessments indirectly through their effect on information search.

Hypotheses Tests

Because the hypotheses include predictions about the indirect effects of client preferences on COURT and RECOM, respectively, path analysis is used to test all hypotheses.[13] For our model, this technique involves regressing each endogenous variable (i.e., TIME, COURT and RECOM) on the variables preceding it in the model. Specifically, we estimate the following three regression equations:

$$\text{TIME} = \alpha_1 + \gamma_{1\cdot1}\text{CP} + \varepsilon_1 \tag{1}$$

$$\text{COURT} = \alpha_2 + \beta_{2\cdot1}\text{TIME} + \varepsilon_2 \tag{2}$$

$$\text{RECOM} = \alpha_3 + \gamma_{3\cdot1}\text{CP} + \beta_{3\cdot2}\text{COURT} + \varepsilon_3 \tag{3}$$

In these analyses, CP (Client Preference) has a value of 1 for subjects in the "investor-preferred" group and zero otherwise. The Pearson correlations among the variables used in the path analysis are shown in table 3, the results of these regression analyses are shown in table 4, and the completed path diagram depicting the standardized regression coefficients is provided in figure 2.

Hypothesis 1 predicts that subjects will attend more to cases with conclusions consistent with the client's preference (i.e., positive precedents) than to cases with conclusions inconsistent with the client's preference (i.e., negative precedents). As panel A of table 4 shows, CP had a significant, positive effect on TIME (std. $\gamma_{1\cdot1} = 0.686$, $t = 7.54$, $p = .00$). Thus, subjects in the dealer- (investor-) preferred condition spent a significantly greater percentage of their search time viewing dealer (investor) cases than they spent viewing investor (dealer) cases.[14] This result supports H1.

Hypothesis 2 posits a positive indirect effect of client preferences on subjects' assessments of the likelihood of judicial success for the client's preferred position, through the effect of client preferences on information search emphasis. This indirect effect is the product of $\gamma_{1\cdot1}$, the effect of CP on TIME, and $\beta_{2\cdot1}$, the effect of TIME on COURT. Support for H2 requires that both $\gamma_{1\cdot1}$ and $\beta_{2\cdot1}$ be significantly positive. As discussed above, $\gamma_{1\cdot1}$ is positive and highly significant. As panel B of table 4 shows, the effect of TIME on COURT is also positive and highly significant (std. $\beta_{2\cdot1} = 0.444$, $t = 3.97$, $p = .00$). These results support H2. The predicted indirect effect of CP on COURT is 0.305 (i.e., 0.686 × 0.444). Knowing that the client prefers to be treated as a dealer (investor) causes the subject to spend less (more) time viewing investor cases which, in turn, leads subjects to assess the likelihood that a neutral court would rule that their client is an investor as lower (higher). The H2 results provide evidence that tax professionals have a difficult time providing unbiased assessments of the strength of client-favorable positions because they perform biased information search.

Hypothesis 3 states that the indirect effect of client preference on the strength with which subjects recommend the client-preferred tax treatment, through the effect of client preferences on information search emphasis, will be positive. This indirect effect is the

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[13] The method of path analysis is described in many statistical reference books (see e.g., Hanushek and Jackson 1977; Pedhazur 1982).

[14] To determine whether subjects systematically searched for positive precedents before negative precedents, or negative precedents before positive precedents, we regressed retrieval order (a variable which, for each subject, ranges from 1 to the total number of cases retrieved) on NEGPOS (an indicator variable representing whether the retrieved case was positive or negative) and a vector of subject indicator variables which control within-subject variance. NEGPOS and retrieval order were not significantly related, indicating subjects did not systematically search for positive cases before negative cases or vice-versa.

TABLE 3
Study 1—Correlations Among Variables Included in the Path Analysis

	TIME	*COURT*	*RECOM*
COURT	.444		
RECOM	.561	.747	
Client Preference (CP)[a]	.686	.343	.571

n = 66

[a] Client Preference (CP) is coded 0 (1) for subjects in the dealer (investor) preferred group. See table 2 for the definitions of all other variables.

product of $\gamma_{1\text{-}1}$, $\beta_{2\text{-}1}$ and $\beta_{3\text{-}2}$. In addition to the previously discussed results for $\gamma_{1\text{-}1}$ and $\beta_{2\text{-}1}$, support for H3 also requires that $\beta_{3\text{-}2}$ be significantly positive. As panel C of table 4 shows, the effect of COURT on RECOM is positive and significant (std. $\beta_{3\text{-}2} = 0.624$, $t = 8.10$, $p = .00$). Thus the results support H3. The indirect effect of CP on RECOM is 0.190 (i.e., 0.686 × 0.444 × 0.624). Knowing the client's preferred tax treatment causes subjects to focus their information search on cases for which the court's conclusion is consistent with the preferred outcome. This in turn leads subjects to assess the likelihood of a neutral court ruling in favor of their client as greater, which, in turn, leads subjects to recommend the client-preferred tax position more strongly.

Consistent with prior research, CP also had a significantly positive, direct effect on RECOM (std. $\gamma_{3\text{-}1} = 0.357$, $t = 4.63$, $p = .00$). Our test of the indirect effect of CP on

TABLE 4
Study 1—Regression Results Supporting the Path Analysis

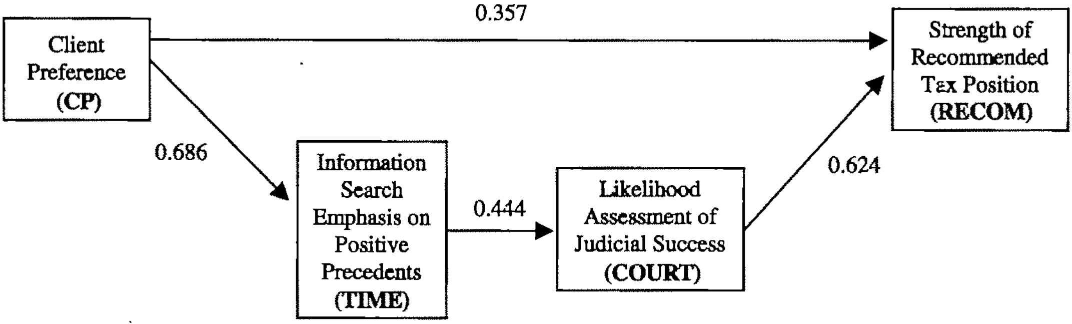
		Coefficient	*Standard Error*	*Standardized Coefficient*	*t*	*p-value*
Panel A: Regression Results for: $TIME = \alpha_1 + \gamma_{1\text{-}1}CP + \varepsilon_1$						
CP	$\gamma_{1\text{-}1}$	0.606	0.080	0.686	7.54	.00
Constant	α_1	−0.227	0.058		−3.93	.00
$R^2 = .471$						
Panel B: Regression Results for: $COURT = \alpha_2 + \beta_{2\text{-}1}TIME + \varepsilon_2$						
TIME	$\beta_{2\text{-}1}$	25.965	6.547	0.444	3.97	.00
Constant	α_2	55.932	2.944		19.00	.00
$R^2 = .197$						
Panel C: Regression Results for: $RECOM = \alpha_3 + \gamma_{3\text{-}1}CP + \beta_{3\text{-}2}COURT + \varepsilon_3$						
COURT	$\beta_{3\text{-}2}$	0.047	0.006	0.624	8.10	.00
CP	$\gamma_{3\text{-}1}$	1.400	0.302	0.357	4.63	.00
Constant	α_3	−3.387	0.352		−9.63	.00
$R^2 = .670$						

n = 66

See tables 2 and 3 for variable definitions.

FIGURE 2

Study 1—Path Diagram of Observed Relations Between Client Preference, Information Search Emphasis, Likelihood Assessments of Judicial Success, and Strength of Recommended Tax Positions


Client Preference (CP)
0.357
Strength of Recommended Tax Position (RECOM)
0.686
Information Search Emphasis on Positive Precedents (TIME)
0.444
Likelihood Assessment of Judicial Success (COURT)
0.624

Path coefficients shown above are the ordinary least squares standardized regression coefficients from table 4. All reported path coefficients are significant at $p \leq .001$.
The indirect effect of Client Preference on COURT (H2) is (0.686 × 0.444) = 0.305.
The indirect effect of Client Preference on RECOM (H3) is (0.686 × 0.444 × 0.624) = 0.190.
The direct effect of Client Preference on RECOM = 0.357.
See table 2 for variable definitions.

RECOM (H3) controls for this direct effect, with the indirect effect of CP on RECOM accounting for approximately 35 percent of the total effect of CP on RECOM (e.g., 0.190 ÷ [0.190 + 0.357] = 0.347). Taken together, these results suggest that when information search is involved, the effects of client preferences on accounting professionals' decision-making processes may be greater than prior research suggests and professional standards anticipate.

To assess the robustness of our results, we performed several alternative tests of the hypotheses, all of which produced the same conclusions as the primary analysis. First, we replicated the path analysis using LISREL (Jöreskog and Sörbom 1989) in order to produce single t-statistics to measure the significance of the indirect effects hypothesized by H2 and H3. The LISREL results are very comparable to those reported in table 4 in terms of both the parameter estimates and the significance levels. The LISREL estimate of the indirect effect of client preference on COURT is 0.33 ($t = 3.21$, $p < .01$), which supports H2. The LISREL estimate of the indirect effect of client preference on RECOM is 0.20 ($t = 2.48$, $p < .01$), which supports H3. Second, we estimated the same system of regression equations shown in table 4 using VIEWED and SAVED as alternative dependent measures of search emphasis. VIEWED and SAVED are ratios defined in the same manner as TIME, but are based on the number of investor- vs. dealer-case components viewed and the number of investor vs. dealer cases saved in subjects' notebooks, respectively. Inferences based on these dependent measures remain unchanged. Third, to provide insights on potential links between variables not tested in the path analysis presented in table 4 (and displayed in the path diagram in figure 1), we estimated a more complete path analysis model. In this analysis, we included CP as an independent variable in all three equations. In addition, we included TIME as an independent variable in analyzing RECOM. According to this analysis, all effects not tested in the original analysis are not significant, while the significance levels of the effects included in the original analysis are essentially unchanged from those reported in table 4. Finally, because prior research suggests that task-specific knowledge and experience affects performance in tax research tasks (Spilker 1995; Cloyd 1997), we tested for possible effects of such variables on each of the dependent measures used in this study. None of the correlations between these experience measures and the dependent measures was statistically significant, which may be due to the relatively low variance of the experience measures.

IV. STUDY 2

The primary focus of study 1 was to determine whether tax professionals use biased information search processes and whether this confirmation bias affects their assessments of the strength of client favorable positions. By design, the client facts in study 1 were such that either position had a realistic possibility of success. Consequently, despite the significant disparity in assessments of authoritative support between conditions, it is not clear that, based on guidelines in tax professional standards, any subject made an incorrect recommendation in study 1. The purpose of study 2, therefore, is to determine whether tax professionals' confirmation bias tendencies in information search can be strong enough to lead them to make incorrect recommendations.

Forty-one Big 5 tax professionals participated in study 2. The average length of employment as a tax professional was 22.9 months (s.d. = 18.7 months). Subjects reported that, on average, 32.5 percent (s.d. = 32.7 percent) of their chargeable time was devoted to tax research tasks, and 11.1 percent (s.d. = 21.2 percent) of their chargeable time was devoted to work in the real estate industry. Ten subjects (24 percent) possessed a master's degree in accounting or tax, 16 (39 percent) had law degrees, and 15 (37 percent) had bachelor's degrees only. Two subjects who responded incorrectly to questions regarding the client's preferred tax position are excluded from the analysis, resulting in a final sample of 39 subjects.

The research method of study 2 was identical to study 1 with the following exceptions: all subjects were in the "investor-preferred" condition and the client facts were modified to strongly suggest that the client should be treated as a dealer (see appendix B for the complete set of facts used in study 2).[15] Modifications of the client facts were made in consultation with two real estate experts to produce a fact pattern for which the investor position could not be supported. The primary modification was an additional paragraph indicating that, prior to the sales in question, the taxpayer had purchased a second, larger tract of land which he improved and subdivided with the intent of immediately selling the lots to individual buyers.[16] The database of court cases from which subjects searched was the same as that used in study 1.

To assess the appropriate tax treatment in study 2, a panel of four real estate experts evaluated the client facts and answered several questions. The panel included a tax partner, a tax principal and two senior tax managers who specialize in real estate for a Big 5 accounting firm.[17] The experts were given the client facts and the same 24 cases available to the subjects. The experts were instructed to work independently and to not use any resources other than those provided. After evaluating the facts and the cases, the experts indicated on average that there was a 13.75 percent chance (range of 10 percent to 20 percent) that the courts would conclude the client was an investor (the client-preferred position). On a seven-point scale with 1 labeled "strongly recommend dealer" and 7 labeled "strongly recommend investor," the experts provided an average response of 1.75 (range of 1 to 2), indicating they would recommend the client be treated as a dealer on the tax return, despite the client's preference to be treated as an investor.

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[15] The probability of an IRS audit (see footnote 3) was not manipulated in study 2.

[16] Two other modifications were made to the facts used in study 1. For the study 2 facts, the taxpayer solicited the help of a friend—who was a real estate developer—to assist the taxpayer in the process of developing and selling the land. Also, the amount for which the taxpayer sold the six initial lots was increased from $120,000 to $150,000.

[17] Members of the expert panel indicated that they spend approximately 30 percent of their time dealing with tax compliance issues and approximately 50 percent of their time dealing with real estate consulting issues. On average, the experts had 12.5 years of tax experience and had encountered in practice the dealer/investor issue 14 times.

In addition, the experts answered two questions dealing with tax preparer and taxpayer penalties. For purposes of the questions, the experts were asked to assume that the client adopted the investor position on his return (without explicitly disclosing the position) and that the IRS selected the return for audit. The experts first assessed the extent to which they would be concerned that the IRS would impose tax preparer penalties due to the position not having a "realistic possibility of success." Responses were solicited on a seven-point scale with 1 labeled "not concerned at all" and 7 labeled "very concerned." The mean expert response was 5.5, indicating a relatively high concern that the investor position would result in tax preparer penalties. Second, the experts assessed their level of concern that the IRS would impose taxpayer penalties due to the investor position not having "substantial authority," using the same scale described for the previous question. Consistent with their judicial outcome assessments, the experts provided a mean response of 6.125 indicating a high concern that the investor position would result in taxpayer penalties. In summary, data collected from the experts indicates a recommendation for the investor position is overly aggressive and would expose both the tax preparer and taxpayer to significant risks.

Study 2 subjects provided an average COURT score of 47.87 percent and an average RECOM score of −0.13. By way of comparison, subjects in the investor-preferred condition of study 1 had average COURT and RECOM scores of 66.74 percent and 1.18, respectively (see table 2). While a comparison of responses between studies indicates that study 2 subjects were, on average, sensitive to the weaker client facts in study 2, it is important that 18 of the 39 subjects in study 2 (46 percent) provided a score of 1 or greater for RECOM, an indication that they would likely recommend investor treatment.[18]

Table 5 provides a comparison of TIME, VIEWED, SAVED and COURT between the 18 study-2 subjects who recommended investor treatment and the 20 study-2 subjects who correctly recommended dealer treatment. Subjects who recommended dealer treatment conducted searches of the database that included a significant portion of cases with dealer outcomes. This is appropriate because, as evidenced by the analysis of the tax experts, the client facts are more similar to the facts of the dealer cases than to the facts in the investor cases. On the other hand, subjects who incorrectly recommended investor treatment conducted searches that were heavily skewed toward investor cases (the client-preferred position). Consequently, subjects recommending investor treatment had significantly greater scores for TIME ($t = 2.77$, $p = .01$), VIEWED ($t = 2.67$, $p = .01$) and SAVED ($t = 5.46$, $p = .00$) than subjects recommending dealer treatment.

As in study 1, the correlation between TIME and COURT is significantly positive ($r = .40$, $p = .01$), an indication that subjects' search processes biased their views of how a neutral court would decide their client's tax issue. Subjects recommending dealer treatment

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[18] By comparison, of the 34 subjects in the investor-preferred condition of study 1, 25 (74 percent) provided a RECOM response of 1 or more, one (3 percent) provided a response of zero, and eight (23 percent) provided a response of less than zero.

TABLE 5
Study 2—Comparison of Information Search Activity and COURT Variables by Recommended Tax Treatment

	Mean (Standard Deviation)			
Variables[a]	*Recommended Dealer Treatment*[b] *(RECOM < 0) (n = 20)*	*Recommended Investor Treatment*[b] *(RECOM > 0) (n = 18)*	*t-statistic*	*p-value*
TIME	−0.020 (0.319)	0.290 (0.374)	2.77	.01
VIEWED	−0.043 (0.272)	0.226 (0.347)	2.67	.01
SAVED	−0.249 (0.467)	0.531 (0.407)	5.46	.00
COURT	22.35 (8.41)	76.67 (11.33)	16.90	.00

[a] VIEWED is the difference between the number of investor-case components (i.e., issue, facts, conclusion and analysis) viewed and the number of dealer-case components viewed, divided by the total number of case components viewed. SAVED is the difference between the number of investor cases saved in the notebook and the number of dealer cases saved, divided by the total number of cases saved. See table 2 for the definitions of TIME and COURT.

[b] The recommended tax treatment groups are based on a dichotomization of the RECOM variable. Subjects with RECOM scores < 0 (> 0) are classified as having recommended dealer (investor) treatment. One subject with a RECOM score of zero could not be classified and, therefore, is excluded from the analyses presented in this table.

had a mean COURT score of 22.35, compared to 76.67 for subjects recommending investor treatment (t = 16.90, p = .00). Also, as in study 1, the correlation between COURT and RECOM is significantly positive (r = .94, p = .00). Therefore, the results of study 2 provide evidence that tax professionals' tendency to systematically emphasize positive over negative information during information search contributes to biased court assessments and can lead to improper recommendations.

Study 2 does not address the issue of *why* some tax preparers (approximately one-half in study 2) have a propensity to implement biased search strategies.[19] It is possible that the tendency to perform biased information searches is related to a predisposition to aggressively pursue the role of client advocate. Although we are unable to pinpoint why study-2 subjects pursued different search strategies, the high percentage of subjects exhibiting confirmation bias and, consequently, making incorrect recommendations suggests that the likelihood of incorrect recommendations arising from confirmation bias in practice is relatively high. Future research may address issues relating to factors underlying tax professionals' tendencies for search bias.

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[19] An analysis of demographic variables provided by subjects indicates no significant differences between the group recommending the investor position and the group recommending the dealer position in terms of overall tax experience, general real estate experience, exposure to the dealer vs. investor issue and type of educational degree.

V. SUMMARY AND CONCLUSIONS

For tax professionals, an important part of the process of recommending a tax position to a client includes information search for relevant authority and, based on the information gathered during the search, providing the client with an accurate assessment of the authoritative support for the tax position. This paper examines how client preferences influence the manner in which tax professionals conduct information search and how this influence on search processes affects professionals' assessments of the level of support for client favorable positions and subsequent recommendations. Study 1's results suggest that tax professionals' information search strategies tend to emphasize judicial precedents with conclusions consistent with client preferences at the expense of attending to precedents with conclusions inconsistent with the client's preferred position. We also find that, in addition to directly affecting tax professionals' recommendations as reported in prior research, client preferences also *indirectly* affect tax professionals' judgments and recommendations through their effect on professionals' information search behavior. Study 2's results indicate the effect of client preferences on information search is strong enough that those who perform biased information search tend to make insupportable recommendations.

These findings suggest that when tax professionals search for judicial precedents in order to resolve an ambiguous tax issue, they find it difficult to evaluate objectively the relative merits of their client's preferred tax position. A potential implication is that, to the extent professionals are unaware that their search processes may be influenced by client preferences, they may unknowingly misjudge the risks associated with the client's preferred tax position. This may lead tax professionals to recommend positions that (1) require the client to assume more risk than desired and (2) do not meet the authoritative support requirements of professional standards or the various penalty provisions of the Internal Revenue Code.

If biased information search strategies are inappropriate and problematic, then why might they persist in practice? Ultimately, tax professionals receive feedback about the correctness of their recommendations when tax positions they advocate are challenged by the IRS. However, because the base rate of IRS audits is so low[20] and audits typically occur long after reporting decisions are made, what little feedback tax professionals do receive is likely to be ineffective (Davis and Solomon 1989). Without corrective feedback, tax professionals may either be unaware of the bias in their information search or believe that biased search strategies are appropriate.

Future research can address more directly the reasons underlying tax professionals' search bias. For example, in a study examining the information search behavior of master of tax students and law students, Cloyd and Spilker (1999) find that the confirmation bias demonstrated in this study is significantly less for law students than for tax students. This result suggests that academic training may at least partially explain why tax professionals behave as they do.

Caution should be exercised in generalizing the results of this study. Although we assert that similar issues may exist in financial accounting and auditing settings, our findings are limited to the tax setting examined in the reported experiment. Further, although our experiment incorporated many features of the tax research environment, we limited the database of cases to a relatively small subset of available cases on the issue. Future research should address tax professionals' information search behavior in less restrictive settings. Similarly, the balance of incentives used in this study was selected to achieve powerful treatments. Future research can address issues relating to how the balance of incentives (e.g., risk of client loss and litigation) may affect tax professionals' information search tendencies. Finally, in practice relatively inexperienced professionals perform the initial research on many tax issues. Although this study demonstrates that search processes of these professionals are subject to confirmation bias, we do not address the extent to which the review process might mitigate the effects of biased search.

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[20] According to IRS data (Internal Revenue Service 1995), the highest individual taxpayer income group (i.e., total income greater than $100,000) had an audit coverage rate of only 2.79 percent.

APPENDIX A: STUDY 1

(Throughout the appendix, where applicable, different information presented to "investor" subjects and "low audit probability" subjects is identified with brackets.)

Panel A: Assignment Memorandum

To: Tax Staff Person
From: S. Miller, Tax Manager
Date: April 3, 1996
Subject: Jim Hunt, character of loss [gain] on sale of land

Jim Hunt is the CEO of Delta Electronics, Inc., an important corporate client for whom we have done audit and tax work for many years. We are in the process of preparing Jim's 1995 income tax return and need to determine whether a $500,000 loss [gain] he realized during 1995 on sales of real estate should be treated as ordinary or capital. (The facts can be viewed by clicking on the "Client facts" button when you have finished reading this memo.) Your task objective is to save in your notebook all cases you would cite in a memo addressing your position on the research issue.

Based on my experience with the IRS District Director's office and what I have heard about their audit plans for high-income individual returns over the next several years, I expect that the probability of Jim's return being selected for audit is fairly high [low] (greater [less] than 50 [5] percent) regardless of the position we take on this transaction.

I.R.C. §1221 defines a "capital asset" by exception. The relevant exception in this case is provided in §1221(1), which provides that "property held by the taxpayer primarily for sale to customers in the ordinary course of his trade or business" is NOT a capital asset.

If Jim's real estate is considered a §1221(1) asset (i.e., Jim is viewed as a "dealer"), then the loss [gain] will be treated as ordinary. In contrast, if the property is not considered a §1221(1) asset (i.e., Jim is viewed as an "investor"), then the loss [gain] will be treated as a capital loss [long-term capital gain]. Obviously, Jim would prefer to be treated as a dealer [an investor] with respect to this property so that he can deduct all of his loss against other ordinary income on his 1995 tax return [his gain will be taxed at the lower, alternative rate for long-term capital gains]. Jim's marginal tax rate on ordinary income is 39.6 percent.

Click on the "Summary of factors" button for a summary of factors considered by courts as indicative of "dealer" vs. "investor" status. This information was included in some firm-wide training materials from a course I attended last year. It should help you get started in your research.

REMEMBER, YOUR OBJECTIVE IS TO SAVE IN YOUR NOTEBOOK ALL OF THE CASES YOU WOULD CITE IN A MEMO ADDRESSING YOUR POSITION ON THE RESEARCH ISSUE. GOOD LUCK!

Panel B: Summary of Factors

Factors considered by the courts as indicative of dealer vs. investor status are summarized below. Courts have stressed that no one factor is determinative and that each case must be considered on its own facts. Moreover, these factors have not always been applied on a consistent basis.

Remember that whether an asset is considered a §1221(1) asset affects the character of the taxpayer's income or loss as follows:

§1221(1) asset → Dealer → Ordinary Income (Loss)
NOT §1221(1) asset → Investor → Capital Gain (Loss)

NUMBER AND FREQUENCY OF SALES. Generally, the greater the number of sales, the more frequent the sales, and the more continuity in sales activities, the greater the likelihood that the taxpayer will be considered a dealer.

DEVELOPMENT ACTIVITIES. Generally, the greater the development activities, the more likely the taxpayer will be considered a dealer.

SALES ACTIVITIES. Generally, the more the taxpayer advertises, solicits customers, lists the property and otherwise promotes the sale of the property, the more likely the taxpayer will be considered a dealer.

PURPOSE OF ACQUISITION. Generally, the purpose for which the property was originally acquired AND the purpose for which the property was held at the time of its disposition are important in deciding whether the taxpayer is a dealer.

Panel C: Client facts

On June 1, 1991, Jim Hunt purchased 40 acres of undeveloped land for $2.3 [*$1.3*] million. Other than his personal residences, this was Jim's first and only real estate purchase. At the time, Jim was confident that the land would appreciate in value due to the planned construction of a regional shopping mall nearby. The land was already zoned for "retail/commercial" use and he hoped to sell the land in a single transaction after construction on the shopping mall began. Unfortunately, plans for the shopping mall fell through in early 1992 and Jim was unable to find a buyer for the property. He began placing advertisements in the local paper once a month, and he put on the property a "for sale" sign that was visible from the highway. Despite Jim's modest sales efforts, he was unable to locate a buyer.

In June 1994, Jim decided that the property would be much more marketable if he subdivided the land into individual lots for residential development. Jim hired an engineer to plat the property into 110 individual lots and to determine the location of streets, etc. Jim submitted the engineer's drawings to the City Planning Board along with his application to have the property's zoning changed to "single family residential." The zoning change was approved in September 1994. Jim incurred engineering and legal costs of $30,000 in this process.

In October 1994, Jim hired a contractor to build the necessary streets, curbs and drainage systems, and to connect the property to the city's utility systems (e.g., water, sewer and electricity). Development was completed by June 1995 at a total cost of $780,000.

In August 1995, Jim sold six developed lots for a total of $120,000. In October, a residential builder offered $2.5 million for the remaining 104 lots. Jim accepted the offer and ceased other sales activities. The sale was completed on November 1, 1995. After accounting for the property improvements and selling expenses, Jim had an overall loss [*gain*] of $500,000 computed as follows:

			[*Investor condition numbers*]
Bulk sale proceeds	$2,500,000		
Sale of six individual lots	120,000		
Less: Selling expenses	(10,000)		
Total amount realized		$2,610,000	
Original basis	$2,300,000		[*$1,300,000*]
Engineering & Legal Costs	30,000		
Development costs	780,000		
Adjusted basis		3,110,000	[*2,110,000*]
Realized loss [*gain*]		$(500,000)	[*$ 500,000*]

APPENDIX B: STUDY 2 CLIENT FACTS

On June 1, 1992, Jim Hunt purchased 40 acres of undeveloped land for $1.3 million. At the time, Jim was confident that the land would appreciate in value due to the planned construction of a regional shopping mall nearby. The land was already zoned for "retail/commercial" use and he hoped to sell the land in a single transaction after construction on the shopping mall began. Unfortunately, plans for the shopping mall fell through in early 1993 and Jim was unable to find a buyer for his property. He began placing advertisements in the local paper once a month, and he put on the property a "for sale" sign that was visible from the highway. Despite Jim's sales efforts, he was unable to locate a buyer.

In June 1995, Jim decided that the property would be much more marketable if he subdivided the land into individual lots for residential development. Jim solicited the help of a friend (a real estate developer), part time, to assist him in the process of developing and selling the land to be referred to as "Mountain View Estates." Jim hired an engineer to plat the property into 110 individual lots and to determine the location of streets, etc. Jim submitted the engineer's drawings to the City Planning Board along with his application to have the property's zoning changed to "single family residential." The zoning change was approved in September 1995. Jim incurred engineering and legal costs of $30,000 in this process.

In October 1995, Jim hired a contractor to build the necessary streets, curbs and drainage systems, and to connect the property to the city's utility systems (e.g., water, sewer and electricity). This development was completed by June 1996 at a total cost of $780,000.

Between August and October 1996, Jim sold six developed lots from the Mountain View Estates development for a total of $150,000. In October, a residential builder offered $2.5 million for the remaining 104 lots. Jim accepted the offer and ceased other sales activities. The sale was completed on November 1, 1996. After accounting for the property improvements and selling expenses, Jim had an overall gain of $500,000 computed as follows:

Bulk sale proceeds	$2,500,000	
Sale of six individual lots	150,000	
Less: Selling expenses	(10,000)	
Compensation for friend	(30,000)	
Total amount realized		$2,610,000
Original basis	$1,300,000	
Engineering & Legal Costs	30,000	
Development costs	780,000	
Adjusted basis		1,110,000
Realized gain		$ 500,000

In January 1996, having become knowledgeable about residential land development, Jim decided to purchase and subdivide an additional 60 acres adjacent to Mountain View Estates. An engineer was hired to plat the land into 200 residential lots, known as "Mountain View Estates, Phase II," and the plans were approved by the City Planning Board in April 1996. In July 1996, Jim hired the same contractor who did the development work on Mountain View Estates to do similar work on Mountain View Estates, Phase II. The contractor constructed the streets, curbs and drainage systems for the Phase II development. The contractor also connected the Phase II lots to the city's utility system. Although development of the Phase II lots was nearly complete by December 1996, none of the Phase II lots had been sold as of the end of 1996. Jim plans to begin selling the lots to individual buyers during 1997.

REFERENCES

American Institute of Certified Public Accountants (AICPA). 1988. *Statement of Responsibilities in Tax Practice, 1988 Revision*. New York, NY: AICPA.

———. 1994. *AICPA Professional Standards, Volume 2*. New York, NY: AICPA.

Bandy, D., A. Judd, and C. Kelliher. 1993. Dealing with shades of gray: The realistic possibility standard. *Journal of Accountancy* (December): 51–58.

Beck, P., J. Davis, and W. Jung. 1996. Tax advice and reporting under uncertainty: Theory and experimental evidence. *Contemporary Accounting Research* 13 (Spring): 49–80.

———, and W. Jung. 1989. Taxpayers' reporting decisions and auditing under information asymmetry. *The Accounting Review* 64 (July): 468–487.

Christensen, A. L. 1992. Evaluation of tax services: A client and preparer perspective. *The Journal of the American Taxation Association* 14 (Fall): 60–87.

Cloyd, C. B. 1997. Performance in tax research tasks: The joint effects of knowledge and accountability. *The Accounting Review* 72 (January): 111–131.

———, and B. C. Spilker. 1999. The tax research strategies of accounting and law students. Working paper, University of Illinois at Urbana–Champaign.

Cuccia, A., K. Hackenbrack, and M. Nelson. 1995. The ability of professional standards to mitigate aggressive reporting. *The Accounting Review* 70 (April): 227–248.

———, and G. McGill. 1998. The role of decision processing strategies in understanding professionals' susceptibility to judgment biases. Working paper, University of Illinois.

Davis, J., and I. Solomon. 1989. Experience, expertise, and expert-performance research in public accounting. *Journal of Accounting Literature* 8: 150–164.

Einhorn, H., and R. Hogarth. 1981. Behavioral decision theory: Processes of judgment and choice. *Annual Review of Psychology* 32: 53–88.

Gardner, R. L, and D. N. Stewart. 1993. *Tax Research Techniques*. New York, NY: AICPA.

Hackenbrack, K., and M. W. Nelson. 1996. Auditors' incentives and their application of financial accounting standards. *The Accounting Review* 71 (January): 43–59.

Hanushek, E. A., and J. E. Jackson. 1977. *Statistical Methods for Social Scientists*. San Diego, CA: Academic Press.

Hite, P. A., T. Stock, and C. B. Cloyd. 1992. Reasons for preparer usage by small business owners: How compliant are they? *The National Public Accountant* (February): 20–26.

Internal Revenue Service. 1995. *IRS Fiscal Year 1995 Annual Data Book*. Publication 55B: Table 11—Returns Filed, Examination Coverage. Washington, D.C.: IRS.

Johnson, L. M. 1993. An empirical investigation of the effects of advocacy on preparers' evaluations of judicial evidence. *The Journal of the American Taxation Association* 15 (Spring): 1–22.

Jöreskog, K. G., and D. Sörbom. 1989. *LISREL 7: A Guide to the Program and Applications*. Second edition. Chicago, IL: SPSS, Inc.

Koehler, D. J. 1991. Explanation, imagination, and confidence in judgment. *Psychological Bulletin* 110 (3): 499–519.

Lord, C., L. Ross, and M. Lepper. 1979. Biased assimilation and attitude polarization: The effect of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology* (November): 2098–2109.

Nisbett, R., and L. Ross. 1980. *Human Inference: Strategies and Shortcomings in Human Judgment*. Englewood Cliffs, NJ: Prentice Hall.

Pedhazur, E. J. 1982. *Multiple Regression in Behavioral Research*. Second edition. New York, NY: Holt, Reinhart, and Winston.

Phillips, J., and R. Sansing. 1998. Contingent fees and tax compliance. *The Accounting Review* 73 (January): 1–18.

Public Oversight Board (POB). 1994. *Strengthening the Professionalism of the Independent Auditor: Report to the Public Oversight Board of the SEC Practice Section, AICPA from the Advisory Panel on Auditor Independence*. Stamford, CT: POB.

Raabe, W. A., G. E. Whittenburg, and J. C. Bost. 1994. *West's Federal Tax Research*. Third edition. St. Paul, MN: West Publishing Co.

Roberts, M. L. 1998. Tax accountants' judgment/decision-making research: A review and synthesis. *The Journal of the American Taxation Association* 20 (1): 78–121.

Salterio, S. 1996. The effects of precedents and client position on auditors' financial accounting policy judgment. *Accounting, Organizations and Society* 21 (5): 467–486.

———, and L. Koonce. 1997. The persuasiveness of audit evidence: The case of accounting policy decisions. *Accounting, Organizations and Society* 22 (6): 573–587.

Schuetze, W. P. 1994. A mountain or a molehill? *Accounting Horizons* 8 (March): 69–75.

Shields, M. D., I. Solomon, and K. D. Jackson. 1995. Experimental research on tax professionals' judgment and decision making. In *Behavioral Tax Research: Prospects and Judgment Calls*, edited by J. Davis, 77–126. Sarasota, FL: American Taxation Association.

Snyder, M., and W. Swann. 1978. Hypothesis-testing processes in social interaction. *Journal of Personality and Social Psychology* (November): 1202–1212.

Spilker, B. C. 1995. The effects of time pressure and knowledge on key word selection behavior in tax research. *The Accounting Review* 70 (January): 49–70.

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Cost System and Incentive Structure Effects on Innovation, Efficiency and Profitability in Teams

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ABSTRACT: The small number of full-scale adoptions of activity-based costing (ABC) coupled with ABC implementation failures have fueled a debate about the costs and benefits of ABC relative to more traditional volume-based costing (VBC) systems. ABC differs from VBC by focusing attention on activities and resources that are under the control of multiple workers. Reducing these costs often requires a coordinated effort. Therefore, incentives that motivate workers to cooperate are a prerequisite to successful process improvements based on ABC. Alternatively, when competitive incentives are combined with ABC, the result can be unexpected and negative. We examine how accounting cost system and incentive structure choices interact. We find that profits are highest when ABC is linked with group-based incentives, which provide high motivation to cooperate. In contrast, the *lowest level* of profit occurs when the same information-rich cost system, ABC, is coupled with tournament-based incentives. VBC, a cost system that provides a lower level of cost driver information, moderates the incentive effect. Thus, our results demonstrate that the effectiveness of ABC relative to traditional VBC is influenced by its interactive effect with incentive compensation.

Key Words: *Activity-based cost systems, Incentive structures, Complementarity, Innovation.*

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I. INTRODUCTION

Many companies adopt activity-based costing (ABC) because managers believe the new costing system will provide nonvolume-related information that can lead to process improvements (Ness and Cucuzza 1995). ABC systems differ from more traditional volume-based costing (VBC) systems by highlighting the consumption of process resources that are under the control of multiple individuals. These resources are typically related to batch-level, product-sustaining or facility-sustaining costs. To reduce such costs typically requires the coordinated effort of multiple workers rather than isolated efforts by individuals.

While many firms have experienced cost reduction and profit improvement by transitioning from VBC to ABC, many other firms have not realized similar benefits (Cooper et al. 1992; Anderson 1995). Several researchers have suggested that the failure to carefully consider a simultaneous redesign of incentive structures may cause ABC implementation failures (Argyris and Kaplan 1994; Shields 1995). For example, Ness and Cucuzza (1995, 133) described resistance to an ABC implementation among managers at Safety-Kleen that resulted from the fear that a "change in the ground rules for calculating profits...might reduce their pay."

Notwithstanding the widespread agreement that incentive structures play a critical role in the success of ABC, little progress has been made toward understanding why this relationship exists or recognizing the types of incentives that are effective. Recent developments such as team-based production, process re-engineering, and cell manufacturing (Hitchcock and Willard 1995) may illuminate the connection between ABC and incentives. These practices are consistent with a redistribution of decision rights and an increase in decentralized, multiperson decision making throughout the organization. By fostering or inhibiting cooperative efforts among workers, incentives can play a key role in the type of decisions that occur. For example, team-based cell manufacturing allows cell members to decide among themselves the order of production, the assignment of tasks and, in some instances, the timing of production. Such process changes or innovations can significantly affect firm efficiency and profitability.

We use the theory of complementary management choices (Milgrom and Roberts 1995) to construct hypotheses about and to test for the interactive effects of cost system and incentive structure choices. Teams of workers were provided with either ABC or VBC information combined with one of two types of incentives, either group-based or individual, tournament-based incentives. We observed production and tested for an effect on the number of process innovations that improved efficiency and lowered costs. Innovative activity is our critical variable because practitioners and researchers have suggested that ABC information can promote process innovations that lead to lower costs (Foster and Swenson 1997, 113; Swenson 1995, 175; Argyris and Kaplan 1994, 84). Evidence from practice also suggests that team-based innovative activity leads to lower cost (Tudor et al. 1996; Sisco 1992, 42). John Deere & Co. extensively uses ABC and has experienced significant team-based process improvements as illustrated by the following example, "At many plants, the company has turned over control of production to so-called self-directed work teams. One...helped overhaul its assembly-line methods by bringing together 12 manufacturing steps at a single site...the team cut assembly costs by over 10%," (Kelly 1994, 65).

Our experimental evidence shows that innovative activity can produce a higher *or lower* level of firm profit when workers have ABC information. Further, firm profitability with VBC information falls between the ABC extremes. The direction of the effect on profitability for both ABC and VBC depends upon whether the incentive structure complements the cost system. Our results are consistent with Milgrom and Robert's (1995, 191) observation that a failure to consider complementarities when making strategic choices can lead to *negative* impacts on firm outcomes. In ABC-type settings, where significant cost reductions can be gained primarily from coordinated efforts of multiple workers, incentives that motivate cooperative innovations result in higher profits. Providing ABC information to workers with individually oriented incentives results in fewer multiperson process innovations and lower profits.

The remainder of the paper is structured as follows. Section II reviews the literature linking cost systems and incentive structures to innovative activity and provides the formal complementarity model that leads to the hypotheses. Section III details the experimental design and procedures. Section IV presents the analysis of the results. Section V summarizes, discusses limitations and concludes the study.

II. COST SYSTEMS, INCENTIVE STRUCTURES AND INNOVATION

Cost Systems

ABC systems, which focus on batch-level, product-sustaining and facility-sustaining costs, provide a higher level of cost-driver information when compared to traditional volume-based costing systems that typically provide only volume-related cost drivers (Dearman and Shields 1998, 5; Swenson 1995, 167). One motive for changing from VBC to ABC is management's belief that workers will be able to use activity-based information to manage and reduce those costs that are not volume related (Swenson 1995, 175). Non-volume-related costs have a variety of drivers and frequently can be affected only by coordinated efforts of multiple workers. For example, prior to implementation of ABC at Chrysler, the design engineers and the manufacturing managers were at odds over the design and production of vehicles (Ness and Cucuzza 1995). Because the design engineers were evaluated on reducing material costs and the manufacturing managers were rewarded for minimizing inventory and labor costs, they came to differing conclusions about the amount and type of materials to design into vehicles. The ABC system provided information that clarified the cost drivers and resolved the conflict. The Chrysler example suggests that activity-based information has the potential to stimulate process improvements created by teams of workers rather than solely by improving the decisions of individual workers. However, incentives play a critical role and must be considered in motivating workers to initiate these types of cooperative innovations.

Several research surveys have shown that an important aspect of successful ABC system implementations is an appropriate linkage to incentive structures. Shields' (1995) survey of 143 firms shows that among firms experiencing benefits from ABC, the benefits are greater when the ABC system is linked to the performance evaluation/incentive system. Shields (1995, 163) studied 17 implementation variables and found the "linkage to performance evaluation and compensation" was the third most significant environmental factor. Foster and Swenson (1997) surveyed 166 managers and concluded that the use of ABC information in incentive-related decisions is a factor in successful ABC implementation. Neither Foster and Swenson (1997) nor Shields (1995) provides detail about either the exact nature of this linkage or the form the incentive system should take.

Incentive Structures

The two incentive structures examined in this study are consistent with prior research on tournament and group incentives. Tournament (TRN) incentive structures occur when a worker's reward is dependent on his/her performance relative to the performance of other workers (Green and Stokey 1983; Nalebuff and Stiglitz 1983; Dye 1984). In this study, we use profits to rank team members and provide differential rewards based on rank. In practice, tournament incentives are frequently observed when rewards are indivisible, e.g., for sales bonuses, grading on a curve and promotion to a higher position where only one of several competing candidates can earn the promotion (Sisco 1992). Alternatively, group incentive structures (GRP) base a worker's reward on the performance of his or her entire team. Thus, as one worker's performance improves, the reward to all team members increases. Group incentive structures have become a more prevalent practice in the economy, in part, because they can increase workers' motivation to exchange information and to innovate processes. For examples of firms who report using team-based incentives see Sisco (1992) and Hendricks et al. (1996).

Several researchers have considered the divergent impact of group and tournament incentive structures on team outcomes (Green and Stokey 1983; Wageman and Baker 1997; Ravenscroft and Haka 1996; Drake et al. 1998). Wruck and Jensen (1994, 276) note that "if teamwork contributes substantially to productivity, rewards based on individual performance destroy value by discouraging cooperation and teamwork....In contrast, rewards based on group or team performance directly encourage cooperation." Nalebuff and Stiglitz (1983, 40) also observed that, "In the competitive system, there are no incentives for cooperation." Thus, if cooperation is required to implement cost-reducing process innovations, tournament incentives will likely inhibit the creation of these innovations.

Innovation

We rely on Schroeder et al.'s (1989, 6) definition of innovation as "the application of new or different approaches or methods or technologies to meet organizational objectives." We interpret innovative activities to include process changes that are implemented by individuals or groups. Past research on the determinants of innovative behavior has led to conflicting conclusions (Damanpour 1991). One reason for the contrary findings is the "scant attention paid to innovation at the individual and group levels" (West and Farr 1989, 17). Instead, accounting research has focused primarily on firm-wide innovation, as measured by expenditure on research and development activities (Sougiannis 1994; Lev and Sougiannis 1996). In this study, we examine process innovation in work teams and classify innovations as either individual or cooperative. Cooperative innovations require the coordination of at least two team members, while only one person working alone carries out an individual innovation.

Complementarity Between Cost Systems and Incentives

We believe that multiperson, process-based innovative activities result when team members have the decision rights to redesign their job, have cost-driver information that reveals the impact of their innovations on costs and are motivated by the incentive structure to emphasize group rather than individual performance. We propose that workers given *complementary* cost information and incentives will use innovation as a key mechanism to lower costs and increase profit.

The neoclassical definition of complementary factors of production focuses on direct inputs such as labor and capital. However, by using a branch of mathematics called lattice theory, more recent economic researchers (Milgrom and Roberts 1995; Topkis 1995) have extended the traditional idea of complementary factors of production to include choices about strategy and structure. These researchers have studied complementary variables that do not meet the divisibility and smoothness criteria that are required under neoclassical definitions of complementarities. For example, breadth of product offerings, human resource practices, relations with suppliers, investment bundling, incentive structures, and many other features of management systems have been investigated as complementary strategy and structure choices (e.g., Jaikumar 1986; Brown et al. 1993; Ichniowski et al. 1997; Miller and O'Leary 1997).

In considering the "fit" of incentive structures and cost system choices we follow the process identified by Milgrom and Roberts (1995) for determining when management-choice variables are complementary. The first and critical step is to confirm that each variable in question can be ordered in some meaningful fashion. Among choices of cost systems, the amount of cost driver information provided can be ordered from lower (VBC) to higher (ABC). Incentive structures can also be ordered on the motivation to cooperate with others from lower (TRN) to higher (GRP).

The second step in determining if variables are complementary is to confirm that increasing (decreasing) the level of one choice variable, for example moving from VBC to ABC, does not prohibit increasing (decreasing) the level of any other choice variable, such as moving from TRN to GRP. For the research issue addressed here, it seems clear that management could choose to change costing systems and incentive structures simultaneously.

The final step in demonstrating complementarity is to show that the objective function is supermodular in the choice variables. This means that the marginal returns to one variable (cost system) are increasing in the level of the other variable (incentive structure). Assume profit (π) is the objective and that profit depends on cost system choice i and incentive structure choice j, with the notation $\pi_{i,j}$, where i = VBC or ABC and j = TRN or GRP.

The supermodularity condition indicates that the following relationships must hold:[1]

$$\pi_{VBC,GRP} - \pi_{VBC,TRN} \leq \pi_{ABC,GRP} - \pi_{ABC,TRN}; \quad (1)$$

$$\pi_{ABC,TRN} - \pi_{VBC,TRN} \leq \pi_{ABC,GRP} - \pi_{VBC,GRP}. \quad (2)$$

Equation (1) implies that the incremental profit of increasing the incentive to cooperate (changing from TRN to GRP) is increasing in the level of cost driver information, i.e., higher in ABC than in VBC. Similarly, equation (2) indicates that the incremental profit of increasing the level of cost driver information (changing from VBC to ABC) is increasing in the level of motivation to cooperate, i.e., higher with GRP than with TRN. We refine our hypotheses further by predicting a very specific relationship, which is more restrictive than the two general conditions required for complementarity.

Hypotheses

Our hypotheses focus on cooperative and individual innovations, cost efficiency and profitability. In general, we expect that firm profitability will be highest when ABC is linked with incentives to cooperate (GRP) and that profitability will be lowest when ABC is linked with tournament incentives (TRN). Further, we demonstrate that the higher profitability from the complementary choice of ABC and GRP occurs through process innovations involving multiple workers. We create separate hypotheses for cooperative and individual innovations because we expect differential effects due to the tournament and group incentive structures.

Cooperative Innovations

The first hypothesis relates to cooperative innovations, that is, those requiring the coordination of at least two workers. We predict a complementarity between the costing system and the incentive structure, such that workers equipped with ABC cost-driver information and motivated to cooperate by the GRP incentives will undertake the highest number of cooperative innovations. Because the ABC cost driver information helps workers to identify and avoid cooperative innovations that could improve another worker's rank, we expect that ABC information combined with TRN incentives will result in the lowest number of cooperative innovations.

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[1] Although expressions (1) and (2) appear to be mathematically equivalent, in Milgrom and Roberts (1995, 183), the "≤" symbol used in these expressions represents a dominance or ordering on the set of outcomes.

While VBC workers face the same incentive structures as ABC workers, we expect the incentive effect on cooperative innovations to be moderated because these workers do not have access to detailed cost-driver information. Without detailed cost-driver information, VBC workers' innovative activities will be unfocused and more random. Thus, we expect that VBC information workers with GRP incentives will create more cooperative innovations than those with TRN incentives. Further, workers with VBC information and TRN incentives will be motivated to create more individual innovations and fewer cooperative innovations. However, VBC workers in general will be less able to discern which innovations have the effect of improving their outcomes. Therefore, we expect that the incentive effect will be amplified with ABC and moderated with VBC. The predicted pattern of means is:

H1: The costing system and the incentive structure have an ordinal interactive effect on the number of cooperative innovations (COOP) undertaken such that:

$$\mathrm{COOP}_{\mathrm{ABC,GRP}} > \mathrm{COOP}_{\mathrm{VBC,GRP}} > \mathrm{COOP}_{\mathrm{VBC,TRN}} > \mathrm{COOP}_{\mathrm{ABC,TRN}}$$

Individual Innovations

We posit that creation of individual innovations, those that can be carried out by an individual working alone, will be consistent with our arguments above. That is, workers with GRP incentives will emphasize cooperative innovations over individual innovations. In addition, workers with TRN incentives will focus on individual innovations to increase their likelihood of a higher ranking. However, the incentive effect will be greater with ABC and moderated with a VBC system because the more detailed cost driver information directs worker attention to innovations that match their incentives. Thus, our second hypothesis predicts a pattern of means opposite that in H1.

H2: The costing system and the incentive structure have an ordinal interactive effect on the number of individual (IND) innovations such that:

$$\mathrm{IND}_{\mathrm{ABC,GRP}} < \mathrm{IND}_{\mathrm{VBC,GRP}} < \mathrm{IND}_{\mathrm{VBC,TRN}} < \mathrm{IND}_{\mathrm{ABC,TRN}}$$

Efficiency

A simple count of production is an insufficient measure of efficiency, as it neglects the important issue of resources consumed to produce units. Therefore, average cost per unit produced is our primary measure of productive efficiency. Like the previous two hypotheses, the efficiency hypothesis stems from the theory of complementarity. $\mathrm{ABC}_{\mathrm{GRP}}$ workers have both the cost driver information and the complementary incentive to create process innovations that reduce costs. Therefore, we expect $\mathrm{ABC}_{\mathrm{GRP}}$ workers to have the most cost-efficient production. Conversely, we expect $\mathrm{ABC}_{\mathrm{TRN}}$ workers to have the highest cost per unit, because these workers use ABC feedback to focus their individual efforts on increasing individual production while avoiding cooperative innovations that might lower their ranking and improve another worker's ranking. We expect workers with VBC information under both incentive conditions to attempt to increase production. However, these VBC workers lack the cost driver information to control costs as effectively as workers with ABC feedback. Thus, our hypothesis regarding efficiency is based on the assumption that the incentive effect on efficiency is amplified with ABC and moderated with VBC:

H3: The costing system and the incentive structure have an ordinal interactive effect on production efficiency, as measured by cost per unit (COST) such that:

$$COST_{ABC,GRP} < COST_{VBC,GRP} < COST_{VBC,TRN} < COST_{ABC,TRN}$$

Profitability

Total firm profits result from high levels of production, combined with the use of minimal resources. Consistent with our predictions regarding innovations and productive efficiencies, we predict total firm profits will be highest for ABC_{GRP} workers and lowest for ABC_{TRN} workers. Again, we hypothesize a complementarity such that the incentive structure effect on profit is moderated in the VBC condition because VBC workers lack detailed cost-driver knowledge.

H4: The costing system and the incentive structure have an ordinal interactive effect on plant profit, (π), such that:

$$\pi_{ABC,GRP} > \pi_{VBC,GRP} > \pi_{VBC,TRN} > \pi_{ABC,TRN}.$$

Hypothesis 4 predicts a stricter ordering of the profits that result from each combination of cost system and incentive type than required by supermodularity. Therefore, if this ordering holds, the test of supermodularity given by the expressions in equations (1) and (2) will be met.

III. EXPERIMENTAL PROCEDURES

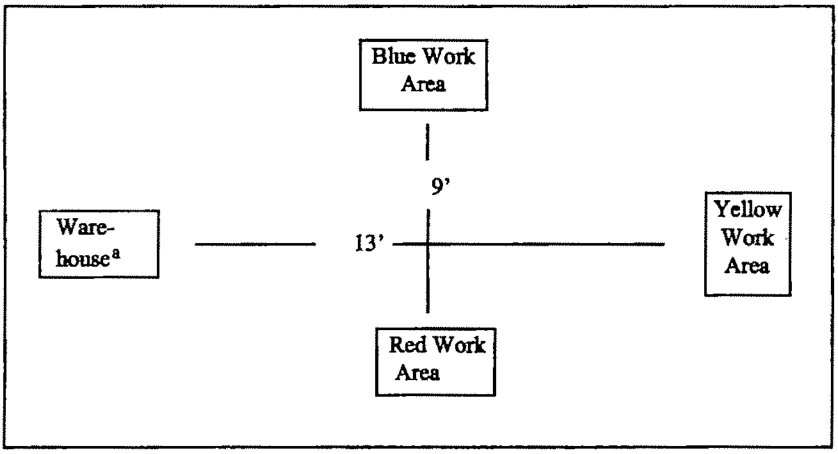
Subjects and Experimental Procedures

One hundred thirty-two workers were recruited from M.B.A. programs at two midwestern universities. Workers in randomly chosen, three-person teams were assigned to a "plant" and to one of three different subassembly tasks. Each "plant" was equipped with three work areas and a "warehouse" and was set up according to a floor plan that specified the location and distance between each work area (see figure 1, panel A). Workers took part in a short training session in which they were shown the completed product, informed of general procedures and rules and provided with sample compensation computations. After a demonstration of the production process in a typical plant, workers were given individual training in performing their assigned subassembly task.

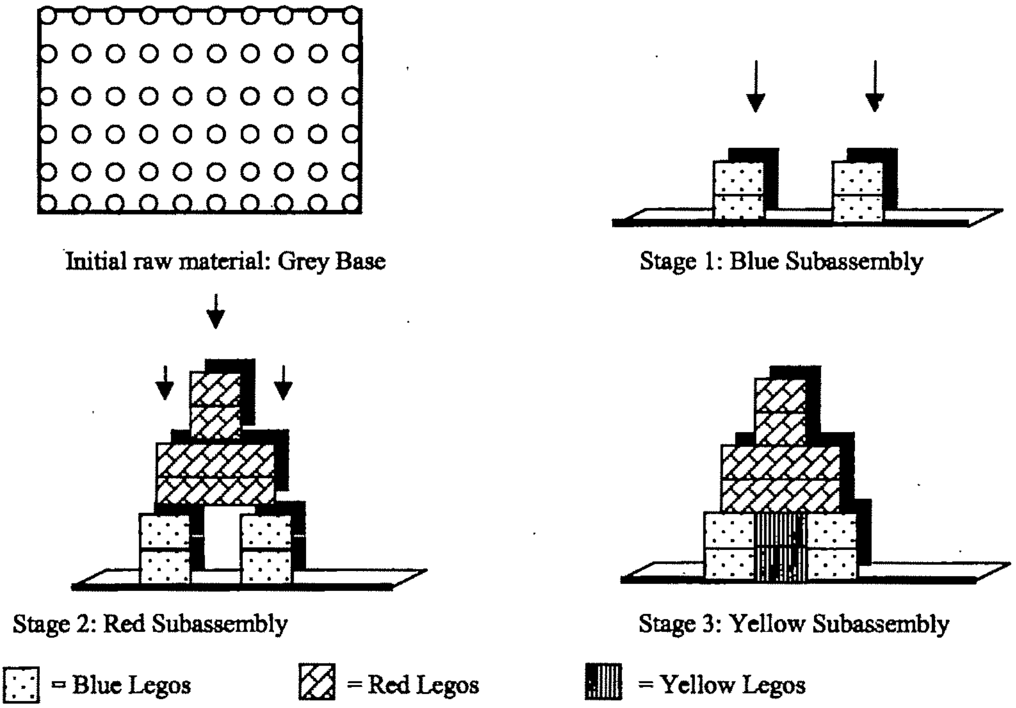
The product consisted of three different-colored subassemblies constructed out of various LEGO™ blocks. Each worker was assigned a designated work area and furnished with a container of single-color LEGOs™ of various sizes. Workers were initially shown a standard production process, with work performed in assembly line order (see figure 1, panel B). In the standard process the blue subassembler's output moves to the red and then the yellow subassembler. The standard production process was designed so that each worker had an equal number of steps to perform. Each period started with the standard plant layout

FIGURE 1
Assembly Line Production Process

Panel A: Plant Layout



Panel B: Assembly Stages


Initial raw material: Grey Base
Stage 1: Blue Subassembly
Stage 2: Red Subassembly
Stage 3: Yellow Subassembly
= Blue Legos
= Red Legos
= Yellow Legos

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[a] The warehouse was a 16" by 12" by 14" plastic storage rack with pull out drawers that fit into three stacked levels. Each worker made use of the drawer(s) in his/her particular level of the warehouse.

and same number of units in work in process.[2] In the standard process, workers obtained their work in process units from and returned their finished subassemblies to a designated location labeled the warehouse. Each type of subassembly was stored in a separate, removable storage bin located inside a specific warehouse level.

After the initial orientation, assignment to a specific team and training (which took approximately 30 minutes), workers participated in four two-minute periods with approximately five minutes between periods. The time between work periods was necessary to return the plant to its original condition and to provide feedback to workers on their productivity and profitability. An experimental confederate, designated as the quality inspector, was present in the plant to record innovations (see appendix A) and ensure that workers complied with plant rules.[3] At the end of each work period, the confederates also counted work-in-process, production and resources used. Work-in-process for each worker consisted of any subassembly that was being worked on when the period ended, or was completed but not being worked on by another worker. When the quality inspectors completed their task, one of the authors was called into the plant to do an independent count of the completed subassemblies, work areas used, warehouse levels used and work-in-process inventory. Both counts were compared and a consensus reached to minimize recording errors. To prevent experimental bias, the confederates were not informed of the experimental manipulations employed during the sessions.

Cooperative and individual innovations were measured separately (see appendix A). For example, agreement between blue and red workers to preassemble parts for each other would count as two cooperative innovations each period the preassembling occurred. If the workers cooperated by changing the order of production, the number of workers who cooperated would be included in the count of cooperative innovations for that period. Individual innovations were recorded when workers initiated activities that required no coordination with other team members. For example, under standard procedures blocks were added one at a time to each subassembly, but workers could be more efficient if they preassembled blocks and then added them to their subassemblies. These types of individual innovations were counted in each period the worker continued preassembling.

Cost System and Incentive Structure Manipulations

Figure 2 shows how incentive structures (TRN vs. GRP) and cost information system (VBC vs. ABC) combinations were manipulated. At the end of each of four work periods, workers were provided with postproduction profitability information based on either an ABC or VBC cost system. Both systems calculated revenues as a linear function of the volume of production ($1 per subassembly produced). This revenue is not the result of an outside sale to a customer, but can be thought of as the transfer price associated with moving the unit to the next step in the assembly process, or as value added at each stage.

The total actual costs under each cost system were determined using the same underlying cost function (see appendix B), but the level of cost detail provided to workers differed. Figure 2, panel A shows that the ABC system identified separate cost pools and

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[2] A small number of completed subassemblies were provided to workers assigned to the second and third steps in order to allow each worker to begin work at the start of each work period. These units are shown as "Beginning work in process" on the Recording Sheet (appendix A). For example, the yellow subassembler had three red subassemblies available on which to begin working. Those three subassemblies are subtracted from the total count in computing the red subassembler's work for the period.

[3] "Plant Rules," of which workers were informed were: 1) To pass quality inspection, colors must be in the correct location on the finished product; 2) You may speak with coworkers at any time; 3) Quality inspectors may not answer questions; 4) Each worker must initially add his/her own color to the product; 5) Quality inspection occurs at the end of the production process; and 6) these are the only rules.

FIGURE 2
Single Period Profit Schedule

Panel A: ABC System

	GRP	TRN		
	PLANT	BLUE	RED	YELLOW
# of Subassemblies Completed	15	6	4	5
× $1.00 =**TOTAL REVENUES**	$15.00	$6.00	$4.00	$5.00
COSTS:				
Warehouse Storage: $1.00 per level used	$3.00	$1.00	$1.00	$1.00
Charge per work area: $2.00 per area used	$6.00	$2.00	$2.00	$2.00
Inventory holding costs: $0.50/subassembly in process	$3.00	$1.00	$1.00	$1.00
TOTAL COSTS	$12.00	$4.00	$4.00	$4.00
Net Profit	$3.00	$2.00	$0.00	$1.00
Divided by Three = **Compensation per Person**[a]	$1.00			

Panel B: VBC System

	GRP	TRN		
	PLANT	BLUE	RED	YELLOW
# of Subassemblies Completed	15	6	4	5
× $1.00 = **TOTAL REVENUES**	$15.00	$6.00	$4.00	$5.00
COSTS:				
× $ .70 = STANDARD COSTS	$10.50	$4.20	$2.80	$3.50
Difference Between Actual and Standard	$1.50	$(.20)	$1.20	$.50
TOTAL COSTS	$12.00	$4.00	$4.00	$4.00
NET PROFIT	$3.00	$2.00	$0.00	$1.00
Divided by Three = **Compensation per Person**	$1.00			

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[a] Compensation for the group incentive was the summed profits of all three periods and compensation for the tournament incentive condition was based on the rank order of the three period summed profits of each worker.

cost drivers for three types of overhead resources: warehouse costs, work area and inventory holding costs. The VBC system, shown in panel B, combined these costs into a single overhead cost pool. These overhead costs were allocated using a standard cost of $.70 per subassembly produced. The total standard costs were then adjusted to the actual cost with a variance, shown in the figure as the difference between actual and standard.[4] Thus, ABC workers received detail about the actual cost per driver for three cost drivers. In contrast, the VBC workers received standard volume-based cost information for the actual production volume and the total variance between actual and standard costs.

Panels A and B of figure 2 also contain an example of the end-of-period cost information workers were shown under the two incentive structures. Under the GRP incentive structure, a work team was shown column 1. With GRP incentives, each of the team's workers' revenues and costs were combined to determine overall plant profits. These plant profits were divided by three to obtain each worker's payoff. Thus, work area charges, warehouse charges and inventory holding costs were considered plant costs and not assigned to individual workers. However, under TRN incentives these costs were assigned to individual workers.

Under TRN incentives, workers were shown columns 2, 3 and 4 in figure 2. For example, each worker whose work area was utilized was charged $2. A worker could avoid this charge if another worker agreed to share his/her work area. Warehouse storage charges were incurred when workers used their assigned storage bins. By delivering their subassembly directly to the next worker and avoiding the warehouse, individual workers could avoid the warehouse charge. However, if a worker accepted subassemblies from another worker or removed them from the warehouse storage bin, those subassemblies were assigned to that worker and they were charged the holding cost for those subassemblies. Workers avoided holding costs by not creating too much inventory between subassemblers. With TRN incentives, all TRN workers were assigned the individual costs and earned individual revenues for each subassembly they produced.

Under the TRN incentive structure, we assigned fixed and unequal rewards to team members based on the rank ordering of individually generated profits.[5] In particular, the worker with the highest total profitability summed over all three work periods was ranked number one and was paid $10, the number two ranked worker was paid $6 and the third ranked $2. Figure 2 shows how each worker's individual profits were calculated and used to determine relative rankings for a single round. During the breaks between production periods, the authors informed workers of their profits using standardized forms illustrated in figure 2. At the end of the first work period, workers were informed that it was a practice round. Results from this first round were neither used to compute workers' final compensation nor included in any of the experimental data analysis. To avoid end-game strategies, workers were unaware of how many work periods they would complete. Just prior to being paid, workers were asked to complete an exit questionnaire. Completing the questionnaire and paying workers took approximately 15 to 20 minutes; the entire experiment took between 60 and 90 minutes. Workers earned an average of $7.60.

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[4] The results of several pilot studies were used to standardize the production process, identify the types of innovations to be measured, establish a standard volume-based cost per unit and the activity-based cost pools. Pilot results were also used to balance expected compensation across cells.

[5] Tournament incentives can have various designs. For example, rather than using fixed amounts, percentages of profit earned could be used to determine the bonus. That is, the most profitable employee could earn a bonus of 50 percent of his/her profits, the next most profitable could earn 25 percent, etc. The critical determinant of a tournament incentive is that the bonuses or rewards are differential and that rank order (relative performance rather than absolute performance) is used to determine who receives the differential amounts.

The cost and revenue functions were designed so that producing more subassemblies could increase an individual's profit but would not necessarily increase firm profits if the result was increased inventory-in-process. Higher production benefited the firm only when production across the three workers was coordinated to avoid building up work-in-process inventory. Inventory holding charges combined with the costs of multiple work areas and warehouse space could significantly reduce overall plant profitability. The profit function was designed to exhibit the greatest complementarities *if* workers created cooperative innovations. The standard process was designed for profits to be approximately equal across all conditions if workers did not undertake innovations. Appendix B illustrates the profit calculations for conditions assumed consistent with our hypotheses and demonstrates that the profit function is supermodular.

Manipulation Checks

An exit questionnaire using 7-point Likert-scaled questions measured potential confounding variables and verified that the experimental manipulations were consistent with the ordering required for complementarity. Five items were used to measure workers' understanding of their cost system. ANOVA results for the teams' summed responses indicate a significant difference across cost systems in the predicted direction ($F = 62.63$, p-value $< .01$). The main effect for cost systems demonstrates that ABC workers had significantly better understanding of cost drivers than VBC workers. Thus, the cost system manipulation produced the ordering of cost driver knowledge which is necessary for complementarity. Three other questions examined workers' understanding of how to apply the cost driver knowledge to reduce costs. There was a significant main effect across cost systems ($F = 14.23$, p-value $< .01$) and across incentives ($F = 5.44$, p-value $< .03$). In addition, there was an interactive effect of cost system and incentive structure on workers' responses ($F = 8.35$, p-value $< .01$). This interaction occurred because ABC_{GRP} workers reported a better understanding of how to use the cost driver information to reduce costs than did ABC_{TRN} workers.

Two items were used to determine if workers understood their incentives. ANOVA results for the work teams' summed responses indicated a significant main effect across incentive structures ($F = 135.97$, p-value $< .01$), verifying that workers perceived differences across manipulations. Six items measured workers' level of cooperative motivation within work teams. ANOVA results show that the incentive effect was significant ($F = 26.6$, p-value $< .001$). To verify these results, we correlated worker responses with the number of cooperative innovations they generated and found a significant positive correlation ($r = .39$, p-value $< .01$). Thus, the incentive manipulation produced an ordering of the motivation to cooperate which is a necessary condition for complementarity.

Data on several control variables (gender, GPA, nationality, self-reported knowledge of ABC, source of knowledge about ABC, and assembly-job experience) were also collected. The only control variable showing a significant difference across manipulations was GPA. Workers with slightly higher GPAs were clustered in the VBC condition. The GPA differences, although statistically significant ($F = 7.14$, p-value $< .01$), were not materially large. The average GPA under the ABC manipulation was 3.53, while under the VBC condition it was 3.65. Any effects of this variable would likely bias the data against the main findings described below. Workers with higher GPAs would be more likely to determine cost drivers and create innovations despite being given less-detailed cost information.

IV. RESULTS AND ANALYSIS

The following experimental results are based on summed outcomes for each three-person team for a given period. Team outcomes were used as units of analysis because individual outcomes are nested within teams and thus would be inappropriate. Table 1, panel A shows the means of the dependent variables by experimental condition for each period and panel B reports the correlations between the dependent variables.

TABLE 1
Dependent Variables—Means and Correlations

Panel A: Means

	Period 1	**Period 2**	**Period 3**	**Period 4**
Cooperative Innovations:				
ABC_{GRP}	4.3	8.5	8.8	9.4
VBC_{GRP}	5.5	7.6	8.0	8.7
VBC_{TRN}	2.3	4.5	6.6	6.8
ABC_{TRN}	1.8	4.0	4.9	5.5
Individual Innovations:				
ABC_{GRP}	4.6	4.4	4.7	4.3
VBC_{GRP}	6.1	5.5	6.3	6.4
VBC_{TRN}	6.4	5.5	5.7	6.0
ABC_{TRN}	5.3	5.5	5.5	6.4
Cost per Subassembly:				
ABC_{GRP}	$ .87	$ .61	$ .42	$ .33
VBC_{GRP}	1.03	.64	.58	.49
VBC_{TRN}	1.07	.71	.69	.56
ABC_{TRN}	.97	.84	.75	.68
Profitability:				
ABC_{GRP}	$ .17	$6.2	$9.6	$11.5
VBC_{GRP}	1.60	5.9	7.3	9.0
VBC_{TRN}	.40	5.8	5.6	8.3
ABC_{TRN}	.82	2.8	3.5	5.2

Panel B: Correlations[a]

	Cooperative Innovations	*Individual Innovations*	*Cost per Subassembly*
Individual Innovations	−.27 (.00)[b]		
Cost per Subassembly	−.42 (.00)	.41 (.00)	
Profitability	.39 (.00)	−.35 (.00)	−.93 (.00)

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[a] Including data from the first work period did not result in significantly different conclusions for results reported here or in the following tables.

[b] p-values in parentheses.

The four dependent measures examined in our hypotheses are not independent of one another, as the correlations in table 1, panel B demonstrate. We believe, however, there is significant value added by analyzing them separately. Innovative activity is the mechanism by which we expect the cost system and incentive structure choices to affect performance. So it is important to assess initially whether the predicted patterns of individual and cooperative innovations occurred.

Although we do not hypothesize a period effect, we include period in our models to control for a lack of independence in the observations across periods. Neither type of innovation—cooperative nor individual—exhibited significant main effects due to period.[6] The data show a main effect for period on both productive efficiency and profitability, but the period variable was not significant in any interaction involving cost systems or incentives. Thus the manipulations did not differentially alter the learning patterns across experimental conditions.

Cooperative Innovations

Table 2 displays the analyses of cooperative innovations, defined as those changes in the original production process that require workers to coordinate their efforts. Panel A of table 2 shows that the average number of cooperative innovations by each team for each work period followed the predicted pattern. To test for the ordinal interaction posited by H1, contrast coding was employed (Rosenthal and Rosnow 1985; Buckless and Ravenscroft 1990). Assume X stands for any dependent variable, the usual interaction and the coefficients or codes (in parentheses) used with a standard ANOVA are disordinal with the form shown below:

$$(1)\ X_{HIGH,HIGH} = (1)\ X_{LOW,LOW} \neq (-1)\ X_{LOW,HIGH} = (-1)\ X_{HIGH,LOW}$$

We assume ABC offers a high and VBC a low level of cost driver information. Similarly, GRP provides a high and TRN a low incentive to cooperate. Thus, the ordinal interaction and coefficients or codes specified by H1 are:

$$(2)\ COOP_{HIGH,HIGH} > (1)\ COOP_{LOW,HIGH} > (-1)\ COOP_{LOW,LOW} > (-2)\ COOP_{HIGH,LOW}$$

To test for the pattern of means examined by our hypotheses 1 and 4, we used a code which mimics the expected pattern of cell means.[7] In addition, the model in a contrast coding test uses only one degree of freedom and is thus a more powerful test. The results of the contrast coding model are displayed in table 2, panel B. Those results are highly significant ($F = 25.71$, p-value $< .001$), providing evidence to support the complementary effect of cost system and incentive structures on cooperative innovations predicted in H1.

Individual Innovations

Hypothesis 2 predicts an ordinal interaction in a pattern directly opposite that of H1. Table 3, panel A displays means for individual innovations per team per period. The results in table 3, panel B show a significant result for the complementary contrast coding model

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[6] In an examination of specific innovations, we found that workers tended to try innovations, discontinue some and replace them with others across periods.

[7] The contrast coding weights used (2, 1, −1, −2) provide a conservative test. Results similar to those reported in tables 2 and 5 occur when using other weight patterns that are consistent with the expected cell mean patterns (e.g., 3, 1, −1, −3; or 4, 1, −1, −4).

TABLE 2
Cooperative Innovations—Hypothesis 1

Panel A: Descriptive Statistics[a]

		COST SYSTEM	
		ABC	*VBC*
INCENTIVES	Group	8.89 (3.02) [36] {2}	8.12 (4.25) [33] {1}
	Tournament	4.79 (4.42) [33] {−2}	6.00 (2.97) [30] {−1}

Panel B: Contrast Model[b]

	SS	*df*	*MS*	*F-stat*	*Signif.*
Model	368.70	1	368.70	25.71	.00
Period	46.47	2	23.23	1.62	.24
Model—Unexplained SS	4.80	8	.60	.04	.99
Total	419.97	11	38.18	2.66	.00

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[a] Cells contain means, (standard deviations), [number of observations] and {contrast code}. The means are based on the number of cooperative innovations created by each three-person team each period.

[b] The total explained sum of squares, degrees of freedom and residual mean square that result from a standard ANOVA are used in the contrast coding analysis. In this ANOVA, 11 degrees of freedom are used in deriving the standard ANOVA-effect estimates—two for period, one each for incentive and cost system, two each for the three interactions involving period and one for the cost-by-incentive interaction. The contrast coding analysis assigns the 11 degrees of freedom differently than ANOVA. There is one degree of freedom for the model and two for the period variable. Any remaining degrees of freedom are assigned to the sum of squares that the contrast model does not explain. The total sum of squares of the contrast model is identical to the explained sum of squares of the traditional ANOVA. If the sum of squares that is unexplained by the contrast model is significant, then the contrast coding is less descriptive of the data than the default ANOVA coding. The standard ANOVA results are available by request from the first author.

($F = 4.83$, p-value $< .05$). However, the pattern of cell means does not follow the contrast coding model precisely. The cell that ran counter to prediction is the VBC_{GRP} condition where workers created more individual innovations than workers in any other condition. These workers were expected to create fewer individual innovations than workers under tournament incentives. A possible explanation is that although the VBC_{GRP} teams were highly motivated by the GRP incentive to create cooperative, rather than individual innovations, they did not possess the cost driver information to guide their choice of innovations. Although the contrast coding model was significant at the .05 level, the results do not fit the predicted relationship as well as they did for cooperative innovations.

Productive Efficiency

Hypothesis 3 predicts that the cost per subassembly will be lowest with ABC_{GRP} and highest with ABC_{TRN} setting. The results in table 4, panels A and B show a significant

TABLE 3
Individual Innovations—Hypothesis 2

Panel A: Descriptive Statistics[a]

		COST SYSTEM	
		ABC	*VBC*
INCENTIVES	Group	4.47 (1.54) [36] {−2}	6.06 (2.12) [33] {−1}
	Tournament	5.79 (2.00) [33] {2}	5.73 (1.95) [30] {1}

Panel B: Contrast Model[b]

	SS	*df*	*MS*	*F-stat*	*Signif.*
Model	18.22	1	18.22	4.83	.05
Period	5.78	2	2.89	.77	.49
Model—Unexplained SS	40.76	8	5.10	1.35	.23
Total	64.67	11	5.88	1.56	.12

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[a] Cells contain means, (standard deviations), [number of observations] and {contrast code}. The means are based on the number of individual innovations summed for each three-person team each period.

[b] The total explained sum of squares, degrees of freedom and residual mean square that result from a standard ANOVA are used in the contrast coding analysis. In this ANOVA, 11 degrees of freedom are used in deriving the standard ANOVA-effect estimates—two for period, one each for incentive and cost system, two each for the three interactions involving period and one for the cost-by-incentive interaction. The contrast coding analysis assigns the 11 degrees of freedom differently than ANOVA. There is one degree of freedom for the model and two for the period variable. Any remaining degrees of freedom are assigned to the sum of squares that the contrast model does not explain. The total sum of squares of the contrast model is identical to the explained sum of squares of the traditional ANOVA. If the sum of squares that is unexplained by the contrast model is significant, then the contrast coding is less descriptive of the data than the default ANOVA coding. The standard ANOVA results are available by request from the first author.

interaction between incentive structure and cost system for cost per subassembly. Panel B shows that the ordinal interaction specified in H3 is strongly supported ($F = 21.82$, p-value $< .001$). We examined several correlations to further explore the relationship between innovations and productive efficiency. The correlations between the average cost per subassembly and the innovation measures are $-.42$ (p-value $< .001$) for cooperative innovations and $+.41$ (p-value $< .001$) for individual innovations (table 1, panel B). Partial correlations show that after controlling for cooperative innovations, the relationship between individual innovations and unit cost remains positive ($r = .34$, p-value $< .001$), while after controlling for individual innovations, the relationship between cooperative innovations and unit cost remains negative ($r = -.35$, p-value $< .001$).

A further investigation of the correlation between number of subassemblies produced and number of innovations shows a lack of significance for both cooperative innovations

TABLE 4
Cost per Subassembly—Hypothesis 3

Panel A: Descriptive Statistics[a]

		COST SYSTEM	
		ABC	*VBC*
INCENTIVES	Group	.45 (.21) [36] {−2}	.57 (.23) [33] {−1}
	Tournament	.75 (.28) [33] {2}	.65 (.37) [30] {1}

Panel B: Contrast Model[b]

	SS	*df*	*MS*	*F-stat*	*Signif.*
Model	1.58	1	1.58	21.82	.00
Period	.78	2	.39	5.39	.02
Model—Unexplained SS	.21	8	.03	.43	.90
Total	2.57	11	.23	3.23	.00

[a] Cells contain means, (standard deviations), [number of observations] and {contrast code}. The means are based on the number of individual innovations summed for each three-person team each period.

[b] The total explained sum of squares, degrees of freedom and residual mean square that result from a standard ANOVA are used in the contrast coding analysis. In this ANOVA, 11 degrees of freedom are used in deriving the standard ANOVA-effect estimates—two for period, one each for incentive and cost system, two each for the three interactions involving period and one for the cost-by-incentive interaction. The contrast coding analysis assigns the 11 degrees of freedom differently than ANOVA. There is one degree of freedom for the model and two for the period variable. Any remaining degrees of freedom are assigned to the sum of squares that the contrast model does not explain. The total sum of squares of the contrast model is identical to the explained sum of squares of the traditional ANOVA. If the sum of squares that is unexplained by the contrast model is significant, then the contrast coding is less descriptive of the data than the default ANOVA coding. The standard ANOVA results are available by request from the first author.

(+.07, p-value > .40) and individual innovations (+.02 , p-value > .80). Taken together, these results reinforce the idea that innovations are significantly associated with subassembly unit cost, but are not associated with the volume of subassemblies produced.[8] The results reflect the specific nature of the revenue and cost functions used for this experiment. Individual innovations were less likely to result in cost savings and more likely to result in a buildup of excess inventory, while group innovations were more likely to include cost savings and avoidance of excess inventory.

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[8] Teams with VBC information produced a significantly higher average number of subassemblies over the three work periods (62.7) than teams with ABC information (57.6), (t = 2.25, p-value < .03). However, VBC workers did not earn a significantly higher level of profits (t = .73, p-value > .47). Additional analysis of profitability is shown in table 5.

Profitability

Hypothesis 4 predicts that average firm profits will again demonstrate the complementary effect between incentive structures and cost systems. As shown in table 1, panel B, profitability is highly correlated with efficiency. Table 5, panel A, presents the mean profit per plant per period. Panel B shows that the predicted complementary model was significant ($F = 20.59$, p-value $< .001$). The profit results reinforce the data on cooperative innovations and productive efficiency, showing that profits are greatest when ABC costing is complemented with a GRP incentive.

In order to explore further what was driving profits, we regressed profit on cooperative innovations, individual innovations and total units produced.

$$\begin{aligned} \pi = -6.88 + {} & .32\,(\text{Coop.}) - .72\,(\text{Ind.}) + .97\,(\text{Units produced}) \\ & (t = 4.8) \quad (t = -5.3) \qquad (t = 12.7) \\ \text{Adj. } R^2 = .64 & \end{aligned} \tag{3}$$

Consistent with the correlations in table 1 (panel B) and with the cost results discussed earlier, equation (3) shows that, in our setting, on average each cooperative innovation increases profitability by \$.32, while each individual innovation decreases plant profitability by \$.72.

V. SUMMARY AND CONCLUSIONS

The experimental approach we used allowed us to investigate one of the important linkages suggested in survey research on ABC implementations—the linkage of the costing system and the incentive structure (Shields 1995; McGowan and Klammer 1997). In this study, providing ABC information did not, in and of itself, consistently lead to increased innovation, efficiency or profits. However, when workers had both increased cost driver information (ABC) and higher incentives to cooperate (GRP), they initiated more cooperative innovations, had lower production costs and higher profits than any other examined combination of cost system and incentive structure. When detailed ABC cost knowledge was combined with a tournament incentive, workers engaged in innovations benefiting only themselves, and the production costs were higher and profits lower than in any other examined combination. The latter results illustrate Milgrom and Roberts' (1995, 191) prediction that, "changing only a few of the system elements at a time to their optimal values may not come at all close to achieving all the benefits that are available through a fully coordinated move, and may even have negative payoffs."

Our results indicate that ABC workers with tournament incentives used the more detailed cost driver information to focus on individual innovations and create more output. The impact was higher cost per unit and lower firm profitability. While some researchers suggest tournaments lead to sabotage (Wruck and Jensen 1994; Nalebuff and Stiglitz 1983), we observed no overt attempts by individual workers to undermine the productivity of other workers.

Limitations

Time limitations restricted the number of periods. It is possible that had the number of periods been greater, different patterns would have emerged. To explore that possibility, we ran a separate analysis using fourth period data and found that results did not differ from those obtained in tables 2 through 5.

We used only two of many possible incentive structures—a group pooling of profits and a rank-order tournament. These incentive structures provide a clear-cut difference in

TABLE 5
Profitability—Hypothesis 5

Panel A: Descriptive Statistics[a]

		COST SYSTEM	
		ABC	*VBC*
INCENTIVES	Group	9.07 (4.66) [36] {2}	7.38 (4.28) [33] {1}
	Tournament	3.82 (3.94) [33] {−2}	6.65 (5.52) [30] {−1}

Panel B: Contrast Model[b]

	SS	*df*	*MS*	*F-stat*	*Signif.*
Model	416.17	1	416.17	20.59	.00
Period	249.82	2	124.91	6.18	.02
Model—Unexplained SS	126.53	8	15.82	.78	.62
Total	792.52	11	72.05	3.57	.00

---

[a] Cells contain means, (standard deviations), [number of observations] and {contrast code}. The means are based on the number of individual innovations summed for each three-person team each period.

[b] The total explained sum of squares, degrees of freedom and residual mean square that result from a standard ANOVA are used in the contrast coding analysis. In this ANOVA, 11 degrees of freedom are used in deriving the standard ANOVA-effect estimates—two for period, one each for incentive and cost system, two each for the three interactions involving period and one for the cost-by-incentive interaction. The contrast coding analysis assigns the 11 degrees of freedom differently than ANOVA. There is one degree of freedom for the model and two for the period variable. Any remaining degrees of freedom are assigned to the sum of squares that the contrast model does not explain. The total sum of squares of the contrast model is identical to the explained sum of squares of the traditional ANOVA. If the sum of squares that is unexplained by the contrast model is significant, then the contrast coding is less descriptive of the data than the default ANOVA coding. The standard ANOVA results are available by request from the first author.

the motivation for cooperative behavior. Both are found in practice and described in theoretical research. Other incentives could be designed and tested in subsequent research.

We used a production setting that benefited from innovations requiring coordination among workers. Other production settings could lead to different results. For example, a setting where individual innovations were more valuable for cost control would show a different impact on firm profitability. This implies that generalization of our results must be made with caution and that there is a need for replications and extensions using alternatively structured incentives, cost systems and production settings.

Future Research

Milgrom and Roberts (1995, 194) cite numerous studies, all outside the accounting literature, investigating the complementary nature of a wide range of organizational practices. Such practices include the length of production runs, levels of work-in-process inventory, number of products offered, human resource policies and relations with suppliers (e.g., Ichniowski et al. 1997; Ghemawat 1995). Research on complementary choices within accounting is beginning to appear. In recent work, researchers have investigated complementarities among investment bundling decisions (see Miller and O'Leary 1997) and between transfer pricing methods and organizational structure choices (Ghosh 1998). Sim and Killough (1998) examine complementarities between TQM, JIT and performance measures.

Accounting—as a critical factor in management control systems—appears to offer rich ground for future study. The factors that contribute to complementary management choices are not well understood. For example, because tasks may create boundaries or limits around the innovative activity of workers the complementary impact of management choices could be affected by task characteristics. Group communication processes may play a key role. In this study ABC workers with GRP incentives reported having significantly higher levels of cost driver knowledge than ABC workers with TRN. This finding is striking because both groups were provided identical cost driver feedback, the same amount of time and exposure, so one would expect the comprehension of the information to be equivalent across these two groups. Understanding group communication processes will require refined observation techniques, but would provide deeper insights to the complementary nature of incentives and information flows within groups. As research in the area of complementarity matures, triangulation of analytical research, field studies and laboratory studies will be needed.

APPENDIX A
RECORDING SHEET[a]

Period: 1 2 3 4 5 6 Date: Time: Plant: A B C

	BLUE	**RED**	**YELLOW**
COOPERATIVE			
1. Move Beg WIP bin	—	—	—
2. Move Work area	—	—	—
3. Wait to produce to coordinate	—	—	—
4. Base to Yellow-Check if yes	—	—	—
5. Work on Beg WIP intermittently	—	—	—
6. Carry other person's subassembly	—	—	—
7. Preassemble for others	—	—	—
8. Avoid Bins altogether	—	—	—
9. Remove red for yellow	—	—	—
10. Other changes in order of production?	Check if yes ______		
INDIVIDUAL			
11. Use two hands	—	—	—
12. Dump bin/dump some	—	—	—
13. Sort blocks by size	—	—	—
14. Preassemble	—	—	—
15. Transfer more than 1 BWIP	—	—	—
16. Transfer more than 1 Ending WIP at a time to next station	—	—	—

---

[a] The confederates also noted innovations created by the workers that were not on the observation sheets.

APPENDIX B
ILLUSTRATION OF THE EXPERIMENTAL SUPERMODULAR FUNCTION

In our experimental setting, plant profits, π, are specifically calculated in each condition as:

$$\text{Plant Profit: } \pi = \$1(\Sigma X_i) - \$.50(\Sigma I_i) - \$1(\Sigma WH_i) - \$2(\Sigma WA_i)$$

where:

i = red, yellow, or blue subassembler
X = completed subassemblies
I = ending inventory
WH = warehouse levels (1 if used or 0, thus $\Sigma WH_i = 0, 1, 2, \text{ or } 3$)
WA = work areas (1 if used or 0, thus $\Sigma WA_i = 1, 2, \text{ or } 3$)

The specific amounts for the variables I, WH and WA are hypothesized to differ depending on the experimental conditions. The table below illustrates the calculation of the hypothesized profit differences due to differences in the levels of cost information and incentive to cooperate assuming behavior consistent with our hypotheses. The values in the table are based upon $x = 15$ for all cells, $I = 6$ for tournament and $I = 5$ for group incentives. Assuming random choices for warehouse and work area use when VBC information is present gives $WA = 1.5$ and $WH = 1.5$. Assuming ABC will be used to maximize individual outcomes under tournament incentives gives $WH = 0$ and assuming ABC with group incentives maximizes cooperative outcomes gives $WA = 1$.

PLANT PROFITS π

	High Cost Driver Information (Activity-Based Costing)	**Low Cost Driver Information (Volume-Based Costing)**
High Motivation to Cooperate (Group Incentive)	$\pi = \$1(15) - \$.5(5) - \$1(0) - \$2(1) = \$10.5$	$\pi = 1(15) - \$.5(5) - \$1(1.5) - \$2(1.5) = \$8$
Low Motivation to Cooperate (Tournament Incentive)	$\pi = \$1(15) - \$.5(6) - \$1(0) - \$2(3) = \$6$	$\pi = \$1(15) - \$.5(6) - \$1(1.5) - \$2(1.5) = \$7.5$

Supermodularity of this profit function is expected to hold because equations (1) and (2) give the following result when applied to profits in the preceding example.

$$\pi_{VBC,GRP} - \pi_{VBC,TRN} \leq \pi_{ABC,GRP} - \pi_{ABC,TRN} \tag{1}$$

$$\$8 - \$7.50 \leq \$10.50 - \$6$$
$$\$.50 \leq \$4.50$$

$$\pi_{ABC,TRN} - \pi_{VBC,TRN} \leq \pi_{ABC,GRP} - \pi_{VBC,GRP} \tag{2}$$

$$\$6 - \$7.50 \leq \$10.50 - \$8$$
$$\$(1.50) \leq \$2.50$$

REFERENCES

Anderson, S. 1995. A framework for assessing cost management system changes: The case of activity-based costing implementation at General Motors. *Journal of Management Accounting Research* 7: 1–51.

Argyris, C., and R. Kaplan. 1994. Implementing new knowledge: The case of activity-based costing. *Accounting Horizons* 8 (September): 83–105.

Brown, C., M. Reich, and D. Stern. 1993. Becoming a higher-performance work organization: The role of security, employee involvement and training. *International Journal of Human Resource Management* 4: 247–275.

Buckless, F. A., and S. P. Ravenscroft. 1990. Contrast coding: A refinement of ANOVA in behavioral analysis. *The Accounting Review* 65 (4): 933–945.

Cooper, R., R. Kaplan, L. Maisel, E. Morrissey, and R. Oehm. 1992. *Implementing Activity-Based Management: Moving from Analysis to Action.* Montvale, NJ: Institute of Management Accountants.

Damanpour, F. 1991. Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal* 34 (3): 555–590.

Dearman, D., and M. Shields. 1998. Managers' cost experience, cost knowledge, and cost-based judgement performance. Working paper, Michigan State University, East Lansing, MI.

Drake, A., S. Haka, and S. Ravenscroft. 1998. Incentive effects on innovation, interaction, and productivity in a group environment. *Advances in Management Accounting* 6: 93–112.

Dye, R. 1984. The trouble with tournaments. *Economic Inquiry* 22 (January): 147–149.

Foster, G., and D. Swenson. 1997. Measuring the success of activity-based cost management and its determinants. *Journal of Management Accounting Research* 9: 109–142.

Ghemawat, P. 1995. Competitive advantage and internal organization: Nucor revisited. *Journal of Economics and Management Strategy* 3 (4): 685–717.

Ghosh, D. 1998. Complementary arrangements of organizational factors and outcomes of negotiated transfer price. Working paper, University of Oklahoma, Norman, OK.

Green, J., and N. Stokey. 1983. A comparison of tournaments and contracts. *Journal of Political Economy* 91 (3): 349–364.

Hendricks, J. A., D. G. Defreitas, and D. K. Walker. 1996. Changing performance measures at Caterpillar. *Management Accounting* 78 (6): 18–24.

Hitchcock, D., and M. Willard. 1995. *Why Teams Can Fail and What to Do About It.* Chicago, IL: Irwin Professional Publishing.

Ichniowski, C., K. Shaw, and G. Prennushi. 1997. The effects of human resource management practices on productivity: A study of steel finishing lines. *The American Economic Review* 87: 291–314.

Jaikumar, R. 1986. Post-industrial manufacturing. *Harvard Business Review* (November–December): 69–76.

Kelly, K. 1994. The new soul of John Deere. *Business Week* (January 31): 64–66.

Lev, B., and T. Sougiannis. 1996. The capitalization, amortization, and value-relevance of R&D. *The Journal of Accounting and Economics* 21: 107–138.

McGowan, A. S., and T. P. Klammer. 1997. Satisfaction with activity-based cost management implementation. *Journal of Accounting Research* 9: 217–238.

Milgrom, P., and J. Roberts. 1995. Complementarities and fit: Strategy, structure, and organizational change in manufacturing. *Journal of Accounting and Economics* 19 (2&3): 179–208.

Miller, P., and T. O'Leary. 1997. Capital budgeting practices and complementarity, relations in the transition to modern manufacture: A field-based analysis. *Journal of Accounting Research* 35 (2): 1–15.

Nalebuff, B. J., and J. E. Stiglitz. 1983. Prizes and incentives: Towards a general theory of compensation and competition. *Bell Journal of Economics* 14: 21–43.

Ness, J. A., and T. G. Cucuzza. 1995. Tapping the full potential of ABC. *Harvard Business Review* 73 (July–August): 130–138.

Ravenscroft, S., and S. Haka. 1996. Incentive plans and opportunities for information sharing. *Behavioral Research in Accounting* 8: 114–133.

Rosenthal, R., and R. L. Rosnow. 1985. *Contrast Analysis: Focused Comparisons in the Analysis of Variance.* Cambridge, U.K.: Cambridge University Press.

Schroeder, R., G. D. Scudder, and E. Elm. 1989. Innovation in manufacturing. *Journal of Operations Management* 8 (1): 1–15.

Shields, M. 1995. An empirical analysis of firms' implementation experiences with activity-based costing. *Journal of Management Accounting Research* 7 (Fall): 148–166.

Sim, K. L., and L. N. Killough. 1998. The performance effects of complementarities between manufacturing practices and management accounting systems. *Journal of Management Accounting* 10: 325–346.

Sisco, R. 1992. Put your money where your teams are. *Training* 29 (7): 41–45.

Sougiannis, T. 1994. The accounting based valuation of corporate R&D. *The Accounting Review* 69: 44–68.

Swenson, D. 1995. The benefits of activity-based cost management to the manufacturing industry. *Journal of Management Accounting Research* 7 (Fall): 167–180.

Topkis, D. M. 1995. The economics of modern manufacturing: Comment. *The American Economic Review* 85: 991–1004.

Tudor, T., R. Trumble, and J. Diaz. 1996. Work-teams: Why do they often fail? *S.A.M. Advanced Management Journal* 61: 31–43.

Wageman, R., and G. Baker. 1997. Incentives and cooperation: The joint effects of task and reward interdependence on group performance. *Journal of Organizational Behavior* 18: 139–158.

West, M., and J. Farr. 1989. Innovation at work: Psychological perspectives. *Social Behavior* 4: 15–30.

Wruck, K. H., and M. C. Jensen. 1994. Science, specific knowledge, and total quality management. *Journal of Accounting and Economics* 18: 247–287.

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Financial Reporting and Auditing Under Alternative Damage Apportionment Rules

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ABSTRACT: This article analyzes the impacts that three alternative damage apportionment rules have on an owner's financial-reporting decision, an auditor's audit-quality choice, and investors' pricing decisions within the context of a perfectly competitive securities market and owner solvency constraints. The strategic interactions between the players' strategies are analyzed within a setting where payoffs are endogenously determined and vary with the damage apportionment rule. These comparisons speak to potential changes resulting from the Private Securities Litigation Reform Act of 1995 which replaced joint-and-several liability with a proportionate liability rule. The main finding is that the audit failure rate can decrease when there is a switch from a joint-and-several to a proportional liability rule despite the fact that audit quality has also declined. This result occurs when there are strategic interactions between the owner's reporting strategy and the auditor's quality decision.

Key Words: *Auditing, Financial reporting, Damage apportionment rules.*

I. INTRODUCTION

The Private Securities Litigation Reform Act of 1995 (U.S. Congress 1995) replaced the long-standing joint-and-several (JS) liability rule with a hybrid proportional liability rule (HP). Auditors had lobbied vigorously to eliminate JS liability claiming that they had frequently been included in lawsuits merely because of their "deep pockets"

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without regard to the merits of the case.[1] Palmrose (1994) finds evidence consistent with these claims. The auditing industry claimed that exposure to the large potential damage awards under the JS rule had forced them to accept excessively high settlements and could reduce the long-run supply of auditing. Supporters of the JS rule claimed that it led to higher levels of audit quality and offered more investor protection compared to proportional liability rules.

This paper analyses how the strategies of owners, auditors and investors interact to determine the *ex ante* audit failure rate under three alternative damage apportionment rules: JS, HP, and a pure proportional (PP) rule (which is currently used in Canada). This paper focuses on the audit failure rate for three reasons: (1) regulators, auditors and investors are more likely to be concerned with the incidence of audit failures rather than with audit quality *per se,* (2) audit failures entail high costs in addition to the economic damages they cause, and (3) focusing on audit failures avoids specifying a particular audit cost function, which would be required if social welfare comparisons were to be made among the damage apportionment rules.

The damage apportionment rule determines who is responsible when a co-defendant is unable to pay his/her entire share of the damages. If all of the co-defendants are always able to pay their share of the damages after the trial, then there are no differences between the damage apportionment rules because there are no unpaid damages to apportion. In order to highlight the impact of apportionment rules on both auditors and audit failure rates, I create an economic setting where the auditor is always solvent, but the original owner may be bankrupt by the end of the trial.[2]

The three damage apportionment rules analyzed in this paper can be compared along the dimension of how much owner insolvency insurance they require the auditor to provide investors. At one extreme is the JS rule which provides full insurance where liable auditors are held responsible for all unpaid damages regardless of their share of the blame. Thus, the auditor bears all of the owner's bankruptcy risk. At the other extreme is the PP rule, which provides no owner insolvency insurance so that a liable auditor is responsible for only the share of the damages that the jury holds him/her responsible for causing. Thus, investors completely self-insure the risk of owner bankruptcy. The HP rule lies in between these two extremes and requires that the liable auditor provide investors with a limited amount of owner insolvency insurance. The 1995 Reform Act established that a co-defendant who is found liable is responsible for paying up to 50 percent more in damages over his/her initially assessed share if there is an unpaid portion of the damages and investors satisfy certain net worth and loss conditions.[3] When the auditor is not held liable for the audit failure, the investors must fully bear the risk of owner insolvency.

This paper focuses on the owner's incentives to misreport and the auditor's incentives to detect it, and the interactions between them. This focus on the owner's reporting incentives has been missing from the auditor liability literature. The auditor knows that his/her strategy can affect the owner's reporting strategy and takes this into account when determining the optimal audit strategy. The owner is also aware of these strategic interactions and takes them into account when determining the optimal reporting strategy. Competitive investors rationally price the firm based on their conjectures of the other players' strategies and the endogenously determined liability payments, which are a function of the damage apportionment rule. This endogeneity is important because the damage apportionment rule influences investors' expected payoffs in the audit failure state, which are then incorporated into prices. These price differences will simultaneously change both the auditor's and the owner's payoffs, which are linked through the firm's price.

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[1] In the 1992 Big 6 Statement of Position, auditors argued that: "The principal causes of the auditing profession's liability problems are unwarranted litigation and coerced settlements...and...the principal cause of unwarranted litigation against the profession is joint-and-several liability" (Arthur Andersen et al. 1992, 1, 6).

[2] I focus on the case of owner bankruptcy because Palmrose (1994) observes that 58 percent of all auditor litigation cases involve the financial failure/distress of the client while there have been only two major audit firm bankruptcies due to litigation exposure in the U.S. (Laventhol and Howarth; Spicer and Oppenheim).

[3] See King and Schwartz (1997) for more on the 1995 Reform Act. For simplicity, I assume that the net worth and loss conditions are always met.

The existence of such strategic interactions between auditing and financial reporting has long been recognized by practitioners and has been empirically and experimentally documented in the accounting literature. Hanson and Watts (1997) use U.K. data to determine that an "interactive" game theory model describes the auditor/manager interaction better than a "static" decision theory model. Hirst (1994) provides experimental evidence indicating that auditors adjust their audit quality in response to managers' incentives to manipulate the financial statements.[4] Additionally, auditors evaluate management characteristics and other risk factors in order to assess the degree of inherent and control risk for a particular engagement. This indicates that auditors are well aware of managers' misreporting incentives and adjust their auditing procedures accordingly.[5]

This paper contributes to the auditor liability literature (examples include Dye 1993, 1995; Dye et al. 1990; Melumad and Thoman 1990; Narayanan 1994; Pae 1996; Schwartz 1997) that focuses on audit quality and the impact that various legal regimes and economic institutions have on it. A common feature of these papers is that owners/managers always employ static reporting strategies (i.e., they always report high). Since the owner's reporting choice never varies with the economic setting, the audit failure rate in these models is always decreasing with audit quality. Thus, the legal regime that leads to the highest level of audit quality will always lead to the lowest audit failure rate.

Schwartz (1997) creates a setting with a perfectly scalable investment project and analyzes the impact of an economic damages measure on the amount invested in the project. Under an economic damages measure, the amount of damages that investors can sue for is equal to their "out-of-pocket" or capital losses.[6] In Schwartz's (1997) model, such a measure leads investors to over-invest in the project because the rule prevents investors from fully internalizing the investment's risk. In the model analyzed here, the economic damages measure results in a price premium (which is equivalent to the amount of over-investment in Schwartz's (1997) setting) that is largest (smallest) under the damage apportionment rule that provides the most (least) owner insolvency insurance.

This paper extends the auditor liability literature in two ways. First, it explicitly analyzes how an owner's endogenously determined financial reporting choice is influenced by the damage apportionment rule and how that choice interacts with the auditor's and investors' strategies. Comparisons of auditing legal regimes in a setting with strategic misreporting by owners and discretionary variations in audit quality allow insights not permitted when the owner's reporting decision is fixed, because it is the interaction of audit quality and the reporting decision that determines the audit failure rate.[7] Second, I find that in this expanded setting, it is no longer the case that the audit failure rate is always decreasing with audit quality. This result demonstrates the importance of explicitly bringing the owner's reporting decision into the analysis because which damage apportionment rule leads to the lowest audit failure rate depends on whether the owner's reporting strategy varies with the legal environment. This result is new to the auditor liability literature.

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[4] Dopuch et al. (1994) and Dopuch et al. (1997) show that experimental subjects employed mixed reporting strategies that varied with the legal regime and that investors adjusted prices to protect themselves in response to the changes in the owner's reporting strategy.

[5] These risk assessment practices have recently been institutionalized by the AICPA (1997) in SAS No. 82, *Consideration of Fraud in Financial Statements*, which identifies over 30 "red flags" that can assist auditors in assessing the risk of fraud. The standard requires auditors to adjust their auditing procedures in response to their fraud assessments.

[6] This economic damages measure corresponds to the current U.S. legal environment. See Pae (1996) and Hillegeist (1998) for other models that incorporate an economic damages measure.

This paper also complements the auditor judgment literature (examples include Fellingham and Newman 1985; Newman and Noel 1989; Shibano 1990, 1994) that analyzes how the auditor's trade-off between Type I and II errors is influenced by the legal regime, while taking into account how this trade-off affects the owner's reporting strategy. These papers exogenously specify the payoffs for the owner/manager and assume that the amount of audit evidence is exogenously determined. The analysis in this paper instead focuses on how much audit evidence the auditor decides to collect in a setting where all of the players' payoffs are endogenously determined.

The next section describes the model and the sequence of events. Section III derives the equilibria under all three damage apportionment rules while section IV analyzes and compares the equilibria. Section V contains a discussion of possible extensions to the model and section VI concludes the paper. Appendix A provides a list of notation and appendix B contains the proofs.

II. MODEL DESCRIPTION

In the United States' fixed audit fee environment, an auditor's motivation to provide privately observed audit quality comes from two primary sources: reputation concerns and legal liability. I abstract from reputation considerations by using a one-period model in order to focus on the legal system. This model examines how an auditor's motivation to supply hidden audit quality changes with the damage apportionment rule while taking into account how the owner's reporting strategy may also change. Figure 1 summarizes the game.

The model has three risk-neutral strategic players: a privately informed owner who is selling his firm, an auditor with a hidden action problem, and competitive investors who buy the firm and decide whether to fund its investment opportunity. I assume that there is a commonly known probability $b \in (0, 1)$ that the owner will be bankrupt by the time damages are awarded at the end of the trial. In the event of an audit failure, a nonstrategic jury determines whether the auditor is liable, and if liable, apportions the blame between the auditor and the owner.

The economic setting involves an owner who is going to sell the entire firm to public investors for some exogenously specified reason (life-cycle, liquidity, etc.) at the beginning of the period.[8] The value of the firm's beginning-of-period assets (which I refer to as its type) can either be high (H) with probability p or low (L) with probability $(1 - p)$. Additionally, each firm has an investment opportunity that must be funded by the investors shortly after the firm's sale or else it will become worthless. The investment opportunity

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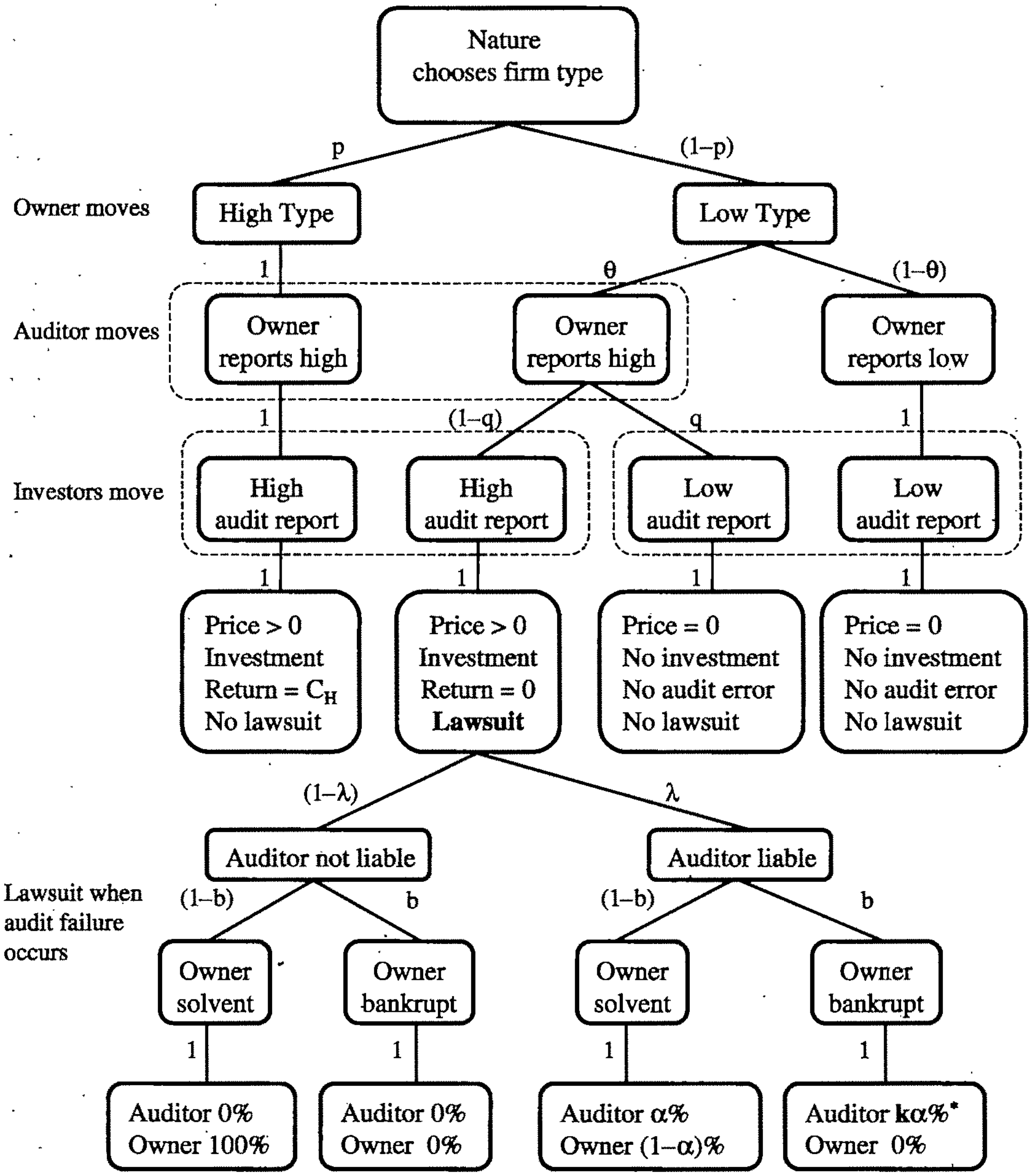
[7] In Schwartz's (1997) "over-investment" setting, an additional consideration in comparing legal regimes is the amount of over/under investment they may induce. This concern cannot be separated from the audit failure rate because one will influence the other and vice versa. When the investment project is not scalable, then the only issue is the audit failure rate.

[8] In addition to simplifying the analysis, this assumption avoids signaling complications; these have already been explored in Datar et al. (1991) among others. As long as signaling through retained ownership percentage does not fully reveal firm type, then the analysis can be interpreted as applying to those firms that form a particular partial pooling equilibrium.

FIGURE 1
Game Tree



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* k is determined by the damage apportionment rule.

requires \$I in funding and represents an expansion of the firm's existing operations so the project cannot be spun off as a separate entity. Investing in the high-type firm (low-type firm) will yield an end-of-period cashflow of C_H (C_L). I assume that without any additional information, investors are willing to fund the project; that is, $p \cdot C_H + (1 - p) \cdot C_L > I$. For simplicity, I normalize both the value of C_L and the discount rate to equal zero.

The economic setting described in this model is motivated by observations about "hot IPO markets" such as have taken place most recently in Internet-related firms. These firms are partially "pre-screened" by virtue of their existing operations and are in markets with enormous growth potential. Investors are willing to fund these risky ventures without waiting to acquire additional information because of large first-mover advantages and the huge potential rewards of investing in one of the eventual winners.

All auditors are assumed to be of the same quality, use the same audit technology and are paid a flat fee. Once hired, the owner provides the auditor with a private set of financial statements $\hat{T} \in \{\hat{H}, \hat{L}\}$ to audit, where $\hat{H}$ ($\hat{L}$) represents the financial statements of a high-type (low-type) firm.[9] It is always a dominant strategy for high-type owners to provide a high report to the auditor. Low-type owners report high θ percent of the time where $\theta \in [0, 1]$ is endogenously determined.

If the owner provides a low report, $\hat{L}$, the auditor knows that it is accurate and issues an unqualified opinion after performing a minimum quality audit. If the owner reports high, $\hat{H}$, the auditor proceeds to conduct an audit whose quality is the auditor's private information. The audit technology produces discrete, one-sided imperfect audit evidence; the auditor may discover errors if they exist, but cannot find or create them if they do not exist. The audit produces evidence $\hat{t} \in \{\hat{a}, \hat{u}\}$, where $\hat{a}$ ($\hat{u}$) indicates that (no) material misstatements were found and that the owner's high report, $\hat{H}$, warrants an adverse, $\hat{a}$, (unqualified, $\hat{u}$) opinion. Let $q \in [\underline{q}, 1]$ represent the quality of an audit, where $\underline{q} \geq 0$ represents a lower bound on audit quality. Quality is defined as the probability of discovering a material misstatement if one exists; that is, $q = pr[\hat{a}|\hat{H}, L]$. The auditor's incremental cost of providing audit quality $q > \underline{q}$, $c(q)$, is increasing and strictly convex in quality. Additionally, $c(\underline{q}) = 0$ and $c(q) \rightarrow \infty$ as $q \rightarrow 1$.

Since evidence of material misstatements is always correct in this model, the auditor will always issue an adverse opinion unless the owner changes the report from high, $\hat{H}$, to low $\hat{L}$. Since the Securities and Exchange Commission would prevent a firm with an adverse opinion from going public, the owner will always change the report and an unqualified low report ($\hat{L}$, $\hat{u}$) will be issued. However, an auditor with no evidence of material misstatements must decide which opinion to issue. Certifying a high report leaves the auditor vulnerable to a lawsuit by investors if the firm is actually of low type, while issuing an adverse opinion without evidence would leave the auditor vulnerable to a lawsuit by a high-type owner. In order to focus on the auditor's quality decision, I assume that an auditor's opinion will always be consistent with the audit evidence.[10] If no material misstatements are found during the audit of a high report, then the owner and the auditor will jointly issue an unqualified high report ($\hat{H}$, $\hat{u}$). Thus, only unqualified reports will be issued publicly in equilibrium.

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[9] This characterization of the auditing process corresponds closely to actual practice where the auditor only expresses an opinion on the financial statements provided by the owner/management, but does not produce an independent set of financial reports.

[10] As long as the monetary and reputation costs of falsely issuing an adverse opinion are high enough (or equivalently, if the level of audit quality is high enough), it will always be a dominant strategy for the auditor to issue a report that is consistent with the evidence. I make the simplifying assumption of accurate reporting in order to avoid this extra level of complexity.

Investors price the firm based on the audited financial statements, $(\hat{H}, \hat{u})$ or $(\hat{L}, \hat{u})$, and their conjectures of the other players' equilibrium strategies. The price P that they pay for a firm with an audited high report is based on the expected value of the firm's future cash flows plus the expected litigation payments in the event of an audit failure. Based on the audited high report, the investors contribute an additional \$I to fund the investment project shortly after the sale has been completed. If the firm issues an audited low report, the investors are certain that the firm is of low type. Therefore, the price is zero, the investment project is not undertaken and the game ends.

If the firm's end-of-period cash flow equals C_H, the game ends because the high cash flow demonstrates that the audited high report was correct. An audit failure occurs when the end-of-period cash flow equals zero, since this shows that the firm is of low type. When this occurs, the investors will sue the owner and the auditor for damages. Since the low-type owner committed a knowing violation of the securities laws, he will always be held joint-and-severally liable, which is in accordance with the 1995 Reform Act. During their deliberations, the jury first determines whether to hold the auditor liable for the audit failure by comparing their noisy observation of the audit's quality to their interpretation of the legally required "due care" level of audit quality. Since there is no explicit formulation of due care, each jury must determine whether the auditor has met this inherently vague standard. I operationalize this concept of vague liability by assuming that, in expectation, the jury finds the auditor negligent with probability λ, where $\lambda \in (0, 1)$ is common knowledge.

If the jury holds the auditor liable, it then determines the relative fault of each defendant. This determination provides the initial basis of how the damages will be split between the auditor and owner. Since the jury has no clear formula or guidelines on how this should be done, I assume that, in expectation, the auditor (owner) is held responsible for α $(1 - \alpha)$ percent of the damages, where $\alpha \in (0,1)$ is common knowledge.[11] The damages are set equal to the investors' economic losses that resulted from their reliance on the fraudulent financial statements. Thus, the economic damages consist of the price P that was paid to the owner plus the \$I used to fund the investment project. The actual damage payments investors ultimately receive depend on the solvency of the owner, the liability of the auditor, and the prevailing damage apportionment rule.

III. DERIVATION OF THE EQUILIBRIA

In this section, the equilibrium strategies for each player under the HP rule will be derived in detail because the other damage apportionment rules are just special cases of the HP rule. This derivation will be followed by a description of how the analyses for the JS and PP rules differ from the HP rule. The exogenous parameters (b, C_H, I and p) and the legal regime parameters (α, λ and k) are all common knowledge. The analysis proceeds by backward induction because of the game's sequential nature. First, the investors' pricing rule will be derived when an audited high report $(\hat{H}, \hat{u})$ is issued. If the investors observe an audited low report $(\hat{L}, \hat{u})$, they always take it as fully credible, price the firm at zero and do not undertake the investment project. Second, the auditor's optimal level of audit quality will be derived when a high private report is received from the owner. If the auditor receives a low report, the auditor takes it as fully credible, performs a minimum quality audit, and an unqualified low report is issued. Third, the low-type owner's optimal misreporting strategy will be characterized. It is always a dominant strategy for a high-type owner to report high. An equilibrium occurs when all three players' conjectures about the other players' strategies are correct, and no player can strictly increase their own expected payoff by changing their strategy.

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[11] I assume that α and λ are exogenous constants. Audit quality would seem to have the potential to influence both the probability of being held liable, λ, and the proportion of the damages for which a liable auditor will be held responsible, α. Section V discusses how the model changes when these assumptions are relaxed.

Investors' Pricing Decision

The price competitive investors are willing to pay for a firm with an audited high report is based on the weighted sum of two mutually exclusive payoffs. The first payoff is equal to the liquidating cash flow of the high-type firm, C_H,[12] weighted by the conjectured probability that there has not been an audit failure, g^c.[13] Thus, the expected value of the first payoff is $g^c \cdot C_H$. The probability g^c is a function of the conjectured probability that the low-type owner reports high (θ^c) and how often the auditor fails to detect an overstatement $(1 - q^c)$. Investors use their knowledge of the owner's report and auditor's opinion along with their conjectures (θ^c, q^c) to calculate via Bayes' Rule, the posterior probability that a firm with an audited high report $(\hat{H}, \hat{u})$ is actually of high type (H):

$$g^c = pr(H|\hat{H}, \hat{u}) = \left[\frac{p}{p + \theta^c(1 - p)(1 - q^c)}\right]. \tag{1}$$

The second payoff is equal to the litigation payments, EL_T, that investors expect to receive from suing the owner and auditor in the event of an audit failure. Since the trial can result in one of four different outcomes, EL_T will equal the weighted sum of the payments in each of these states. These payments and their respective probabilities are as follows: (1) with probability $(1 - \lambda)(1 - b)$, the auditor is not found liable and the owner is solvent; therefore, the investors will recover all of their losses, $(P_{HP} + I)$; (2) with probability $(1 - \lambda)b$, the auditor is not found liable and the owner is bankrupt; therefore, the investors will recover none of their losses; (3) with probability $\lambda(1 - b)$, the auditor is held negligent and the owner is solvent; therefore, the investors will recover $(P_{HP} + I)$; and (4) with probability λb, the auditor is held negligent and the owner is bankrupt; therefore, the investors will recover only $k\alpha$ percent of their total losses, or $\alpha k(P_{HP} + I)$. It is only in this last case that differences arise between the damage apportionment rules. Since liability payments only occur when there has been an audit failure, the expected liability payments are weighted by $(1 - g^c) = pr(L|\hat{H}, \hat{u})$; the investors' conjectured probability that a firm with an audited high report is actually of low type. Summing up these terms and simplifying yields the investors' expected liability award:

$$(1 - g^c) \cdot EL_T = (1 - g^c)[(1 - b) + \alpha bk\lambda] \cdot (P_{HP} + I). \tag{2}$$

The sum of these two expected payoffs $(g^c \cdot C_H + (1 - g^c) \cdot EL_T)$ minus the \$I that will be invested in the project equals the price competitive investors are willing to pay for a firm with an audited high report. Thus:

$$P_{HP} = g^c \cdot C_H + (1 - g^c)[(1 - b) + \alpha bk\lambda] \cdot (P_{HP} + I) - I \Rightarrow \tag{3}$$

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[12] This implicitly assumes that the audit fee is paid by the owner before the sale of the firm. Otherwise, the end-of-period cash flow would vary with the legal regime.

[13] The c-superscript is used to indicate that a variable is either one player's conjecture of another player's strategy or is a function of such conjectures. The superscript is omitted when the variable refers to an equilibrium value, since all conjectures must be correct in equilibrium.

$$P_{HP}[g^c + (1 - g^c)(b - \alpha bk\lambda)] = g^c \cdot C_H - [g^c + (1 - g^c)(b - \alpha bk\lambda)] \cdot I \Rightarrow \tag{4}$$

$$P_{HP} = \left[\frac{g^c}{g^c + (1 - g^c)(b - \alpha bk\lambda)}\right] \cdot C_H - I. \tag{5}$$

Auditor's Quality Decision

Since the audit fee is fixed, the auditor will choose to supply the level of audit quality that minimizes the sum of the direct auditing costs and the amount of liability payments the auditor expects to make, EL_A^c. The auditor faces a potential liability payment whenever a high report from a low-type firm is given an unqualified opinion. This is expected to happen with probability $\theta^c(1 - p)(1 - q)/[p + \theta^c(1 - p)]$, which is the joint probability that the high report is from a low-type firm and that the auditor fails to detect the overstatement. This probability depends on the auditor's conjecture of the low-type owner's reporting strategy, θ^c, and the actual quality of the audit performed, q.

If the jury does not find the auditor liable for the audit failure, then the auditor will not be required to pay any damage awards. This happens with probability $(1 - \lambda)$. With probability λ, the jury determines that the auditor is responsible for α percent of the investors' losses. The amount that the auditor actually pays depends on the owner's solvency status and the prevailing damage apportionment rule. If the owner is solvent (which occurs with probability $(1 - b)$), then the auditor will pay $\alpha(P_{HP} + I)$, but if the owner is bankrupt (which occurs with probability b), then the auditor will pay $\alpha k(P_{HP} + I)$, where $k > 1$. After simplifying and rearranging terms, the auditor's conjecture of the expected liability payments given a high report by the owner, EL_A^c, is as follows:

$$EL_A^c = \frac{\theta^c(1 - p)}{p + \theta^c(1 - p)}(1 - q)[\alpha(1 - b)\lambda + \alpha bk\lambda] \cdot (P_{HP}^c + I) \tag{6}$$

where P_{HP}^c is the auditor's conjecture of the investors' pricing decision.

The auditor's optimal choice of audit quality is the unique value of q that minimizes the sum of the auditor's incremental direct auditing costs and expected liability payments:

$$c(q) + \frac{\theta^c(1 - p)}{p + \theta^c(1 - p)}(1 - q)[\alpha(1 - b)\lambda + \alpha bk\lambda] \cdot (P_{HP}^c + I). \tag{7}$$

Taking the derivative of equation (7) with respect to q and setting it equal to zero gives:

$$c'(q) = \frac{\theta^c(1 - p)}{p + \theta^c(1 - p)}[\alpha(1 - b)\lambda + \alpha bk\lambda] \cdot (P_{HP}^c + I). \tag{8}$$

The unique value of q which satisfies equation (8) is the auditor's optimal choice of audit quality under the HP rule, q_{HP}^*. At q_{HP}^*, the auditor's marginal cost of additional audit quality just equals the marginal reduction in expected liability payments (i.e., the marginal benefit from audit quality).

Owner's Reporting Decision

If the low-type owner reports accurately, an audited low report $(\hat{L}, \hat{u})$ will always be received and the firm will be sold for the normalized price of zero. If the low-type owner misreports, the high report will receive an unqualified opinion with probability $(1 - q^c)$, where q^c represents the owner's conjecture of the auditor's quality decision. If the low-type owner successfully misreports, the expected benefits equal P^c_{HP}, which is the owner's conjecture of the investors' pricing decision. The solvent owner's expected costs for successfully misreporting depend on whether the jury finds the auditor liable. If the auditor is found liable, the owner will be responsible for paying $(1 - \alpha)$ percent of the investors' losses. This occurs with probability λ. If the auditor is not held liable, then the owner will be responsible for paying all of the investors' actual damages, $(P_{HP} + I)$. This occurs with probability $(1 - \lambda)$. Combining terms yields the low-type owner's expected costs of misreporting: $[(1 - b)(1 - \alpha)\lambda + (1 - b)(1 - \lambda)]\cdot(P^c_{HP} + I)$.

The low-type owner will always misreport (report accurately) when the expected net benefits of misreporting are strictly positive (negative). When the net benefits equal zero, the owner will be indifferent between the two reporting choices and it will be a weakly dominant strategy to use a mixed or "interactive" reporting strategy. The low-type owner chooses θ (the probability of reporting high) to maximize the expected net benefits based on his/her conjectures of the investors' pricing decision (P^c_{HP}) and the auditor's quality decision (q^c).

$$\max_{\theta\in[0,1]} \theta \cdot \{(1 - q^c) \cdot [P^c_{HP} - [(1 - b)(1 - \alpha)\lambda + (1 - b)(1 - \lambda)] \cdot (P^c_{HP} + I)]\} + (1 - \theta) \cdot 0 \Rightarrow \tag{9}$$

$$\max_{\theta\in[0,1]} \theta \cdot \left\{P^c_{HP} - \left[\frac{(1 - b)(1 - \alpha\lambda)}{\alpha(1 - b)\lambda + b}\right] \cdot I\right\} \Rightarrow \tag{10}$$

$$\theta^* = \begin{Bmatrix} 0 & \text{if } P^c_{HP} & < & M(\alpha) \\ \theta^c & \text{if } P^c_{HP} & = & M(\alpha) \\ 1 & \text{if } P^c_{HP} & > & M(\alpha) \end{Bmatrix} \tag{11}$$

where $M(\alpha) = [(1 - b)(1 - \alpha\lambda)/[\alpha(1 - b)\lambda + b]] \cdot I$ and $\theta^c \in (0, 1)$ equals the auditor's and investors' conjecture of θ.[14] $M(\alpha)$ can be interpreted as the low-type owner's expected costs of misreporting and the firm's price as the expected benefits of misreporting.[15] The expected costs of misreporting, $M(\alpha)$, decrease with α because the solvent owner is being held responsible for a smaller percentage of the damages when the auditor is found liable.

Joint-and-Several and Pure Proportional Rules

The three damage apportionment rules can be characterized in terms of the proportional damage multiplier k. The higher k is, the less (more) owner-bankruptcy risk the investors (auditor) bear(s). At one extreme is the joint-and-several rule where the liable auditor is responsible for all of the owner's unpaid share of the damages. This is equivalent to a hybrid proportional rule where $\alpha k = 1$. At the other extreme is the pure proportional rule where the negligent auditor is only responsible for the original share of the damages when the owner is bankrupt. This is equivalent to a hybrid proportional rule where k = 1. Given this parameterization, the equilibrium strategies under the JS and PP rules can be derived easily.

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[14] When $P^c_{HP} = M(\alpha)$, the low-type owner is indifferent between the two reporting choices. Thus, the proposed equilibrium strategy $\theta^* = \theta^c$ is weakly dominant because no other value of θ can strictly increase the low-type owner's expected utility, taking the other players' strategies as given. At $\theta^* = \theta^c$, the other players cannot gain by unilaterally changing their strategies, so the strategies derived above form a Nash equilibrium. Additionally, it can be shown that $\theta^* = \theta^c$ represents the unique mixed-strategy equilibrium.

[15] This emphasis on the monetary costs in a civil trial understates the expected costs of misreporting by ignoring the costs of possible criminal charges brought by the SEC. Introducing these costs would shift the $M(\alpha)$ curve up without changing its overall downward slope. Since the analysis relies on its downward slope, the qualitative results would remain the same if these costs were included in the analysis, although the parameter space over which θ^* is nonzero would be reduced.

When the damage apportionment rule changes, the investors' expected liability payments will also change in the state where the auditor is held liable and the owner is bankrupt. Under the JS rule, the investors will recover all of their economic losses, $(P_{JS} + I)$, while under the PP rule, investors will only recover $\alpha(P_{PP} + I)$. The equivalent pricing equations under the JS and PP rules can be found by substituting $\alpha k = 1$ and $k = 1$, respectively, into the HP pricing rule found in equation (5) above. Doing so yields the following pricing equations:

$$P_{JS} = \left[\frac{g^c}{g^c + (1 - g^c)(b - b\lambda)}\right] \cdot C_H - I \qquad (12)$$

$$P_{PP} = \left[\frac{g^c}{g^c + (1 - g^c)(b - \alpha b\lambda)}\right] \cdot C_H - I \qquad (13)$$

The damage apportionment rule also affects the liability payments that the auditor expects to make when there is an audit failure. This in turn changes the auditor's marginal benefit from audit quality. The equivalent optimal audit quality equations under the JS and PP rules can be found by substituting $\alpha k = 1$ and $k = 1$, respectively, into the HP audit quality function found in equation (8) above. This yields the following optimal audit quality equations:

$$c'(q) = \frac{\theta^c(1 - p)}{p + \theta^c(1 - p)} \cdot [\alpha(1 - b)\lambda + b\lambda] \cdot (P^c_{JS} + I) \qquad (14)$$

$$c'(q) = \frac{\theta^c(1 - p)}{p + \theta^c(1 - p)} \cdot \alpha\lambda(P^c_{PP} + I) \qquad (15)$$

Since the investors' pricing rule and the auditor's choice of audit quality change with the damage apportionment rule, the price of a firm with an audited high report will also change, *ceteris paribus*. This will change the low-type owner's expected benefits of misreporting. The expected costs of misreporting, $M(\alpha)$, are the same under all three damage apportionment rules. Hence, the low-type owner is concerned only about the damage apportionment rule to the extent that it changes the price investors are willing to pay for a firm with a high audited report. Therefore, the reporting decision under the HP rule summarized in equation (11) also holds for the JS and PP rules, except that the conjectured price corresponds to the prevailing damage apportionment rule.

IV. ANALYSIS AND RESULTS

The equilibria in this model are unique and can be characterized by the low-type owner's reporting strategy: accurate reporting, interactive/mixed reporting, and misreporting. The equilibrium reporting strategy for the low-type owner will change from an accurate reporting strategy to an interactive reporting strategy to a misreporting strategy as α, the percentage of responsibility assigned to a liable auditor, increases.[16] When α is small, the owner's expected costs of misreporting are relatively high because the owner will be held responsible for most of the damages. As α increases, the expected misreporting costs decrease and the low-type owner will play a mixed reporting strategy. When the misreporting costs become small enough (that is, when α becomes large enough), the low-type owner will never be deterred from misreporting because the net benefits from doing so are always positive.

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[16] All three types of equilibrium strategies may not exist over the range of α for all possible combinations of the exogenous parameter values, although at least one type of equilibria will always exist.

Define α_1^j as the lowest value of α where the expected costs of misreporting just equal the expected benefits in equilibrium under damage apportionment rule j; that is, $\alpha_1^j = \min\{\alpha | M(\alpha) = P_j(\alpha)\}$ for $j \in \{JS, HP, PP\}$. When $\alpha < \alpha_1^j$, the low-type owner always reports accurately, so audit failures do not occur. Given the absence of audit failures, investors bid up the price of the firm to the "full insurance" price, C_H, under all three damage apportionment rules. The damage apportionment rule is irrelevant because there are never any damages to apportion. Since the expected benefits of misreporting, $P_j = C_H$, and the expected costs, $M(\alpha)$, are the same under all three damage apportionment rules, this implies that the lowest value of α that sets them equal, α_1^j, is the same for all j. Henceforth, the superscript j will be suppressed with respect to α_1.

Define α_2^j as the highest value of α where the expected costs of misreporting just equal the expected benefits in equilibrium under damage apportionment rule j; that is, $\alpha_2^j = \max\{\alpha | M(\alpha) = P_j(\alpha)\}$ for $j \in \{JS, HP, PP\}$. When $\alpha_1 < \alpha < \alpha_2^j$, the low-type owner employs an interactive reporting strategy, where the equilibrium value of θ is a function of α and the damage apportionment rule. Recall that $M(\alpha)$ is decreasing in α. The intuition behind why there is a range of α that results in interactive equilibria is that the price is also decreasing at exactly the same rate as $M(\alpha)$ throughout the range, $\alpha_1 < \alpha < \alpha_2^j$. Price declines because the audit failure rate over this range is increasing by just enough to ensure that $P_j(\alpha) = M(\alpha)$ (see Proposition 4). Essentially, α_2^j is that value of α where the probability of misreporting, θ, first becomes equal to 1. When $\alpha > \alpha_2^j$, the low-type owner always misreports.

The equilibrium audit failure rate in this model equals $\theta(1 - p)(1 - q)/[p + \theta(1 - p)(1 - q)] = pr(L|\hat{H}, \hat{u}) = (1 - g)$; it is the probability that a firm with a high audited report is actually of low type.[17] The audit failure rate is increasing in the probability of misreporting, θ, and decreasing in audit quality, q, *ceteris paribus*.

The differences among the three damage apportionment rules arise only in interactive and misreporting equilibria where audit failures, liable auditors and owner bankruptcy each occur with positive probability. I will first discuss the results for the misreporting equilibria as these are essentially equivalent to those settings analyzed in the auditor liability literature where the low-type owner follows a static reporting strategy, i.e., always reports high.[18] This will be followed by the equivalent results for the interactive equilibria where the owner's reporting strategy interacts with and changes in response to the other players' strategies. Significant differences in the results arise when the owner's reporting strategy varies with the legal environment. These differences center on which damage apportionment rule results in the lowest audit failure rate.

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[17] This characterization of an audit failure is consistent with the definition of audit risk adopted by the AICPA: "This definition of audit risk does not include the risk that the auditor might erroneously conclude that the financial statements are materially misstated" (AICPA 1983, AU312.02 para. 2, footnote 2). In terms of the model, this implies that $pr(\hat{a}|\hat{H}, H) = 0$.

[18] Examples include Dye et al. (1990), Dye (1993, 1995), Melumad and Thoman (1990), Pae (1996) and Schwartz (1997) among many others. These papers generally assume that the owner is always bankrupt, the auditor is joint-and-severely liable, and there are no misreporting costs for the owner.

Misreporting Analysis

The following comparisons can be made for misreporting equilibria. These comparisons can also be seen in figures 2 and 3, which show the players' strategies under each damage apportionment rule for all three types of equilibria. To ease the exposition, all increases or decreases should be considered strict unless otherwise noted. The proofs to all of the results can be found in appendix B. Let $\bar{\alpha}_2 = \max\{\alpha_2^{JS}, \alpha_2^{HP}, \alpha_2^{PP}\}$.

Proposition 1: For $\alpha > \bar{\alpha}_2$, price, audit quality and the audit failure rate are ranked as follows: (I) $P_{JS} > P_{HP} > P_{PP}$, (II) $q_{JS}^* > q_{HP}^* > q_{PP}^*$, and (III) $(1 - g_{JS}) < (1 - g_{HP}) < (1 - g_{PP})$.

The intuition behind this result is relatively straightforward because the owner is not an active player in the game. For a given α and audit quality, investors will pay more for a firm under a damage apportionment rule that provides more owner insolvency insurance because the insurance increases their expected returns in the audit failure state. The amount of this insurance is highest under the JS rule and lowest under the PP rule. Additionally for a given α and price, the auditor will supply more audit quality as the expected costs of an audit failure increase. These costs are increasing in the amount of owner insolvency insurance that the auditor is required to provide.

These initial differences among the damage apportionment rules are compounded because price and audit quality act as strategic complements under misreporting equilibria. Higher prices lead to higher levels of audit quality because they increase the auditor's expected costs in the event of an audit failure. Likewise, higher levels of audit quality lead to higher prices because they increase the probability that the firm is actually of high type.

When audit quality is higher, the audit failure rate is strictly lower in misreporting equilibria because there are no changes in the owner's reporting strategy (i.e., θ is constant at 1) that could produce an offsetting effect. Thus, the damage apportionment rule that supplies the most (least) owner insolvency insurance, JS (PP), leads to the lowest (highest) audit failure rate in this setting.

Without specifying the audit cost function, c(q), definitive social welfare comparisons among the damage apportionment rules cannot be made under either misreporting or interactive equilibria. From a policy perspective then, a logical focus is on the audit failure rate. Audit failures involve other costs that are not included in the model. These costs are potentially quite large and include court costs, legal fees, and potentially lower trading volumes. In terms of the audit failure rate, the model's implications in a static reporting environment are clear: the more audit quality, the better. The negative relationship between the audit failure rate and the amount of owner bankruptcy insurance holds because the owner's reporting decision does not change with the damage apportionment rule in these equilibria.

Under the HP rule, an increase in the sharing parameter k effectively increases the amount of owner insolvency insurance that the auditor is required to provide. This serves to increase the amount of damages that the auditor expects to pay if an audit failure occurs. As stated in the following corollary, this produces effects similar to those described in Proposition 1.

Corollary 1: For $\alpha > \alpha_2^{HP}$, an increase in the sharing parameter k under the hybrid proportional rule leads to an increase in audit quality, an increase in the firm's price and a decrease in the audit failure rate.

FIGURE 2
Misreporting Probability and Audit Quality

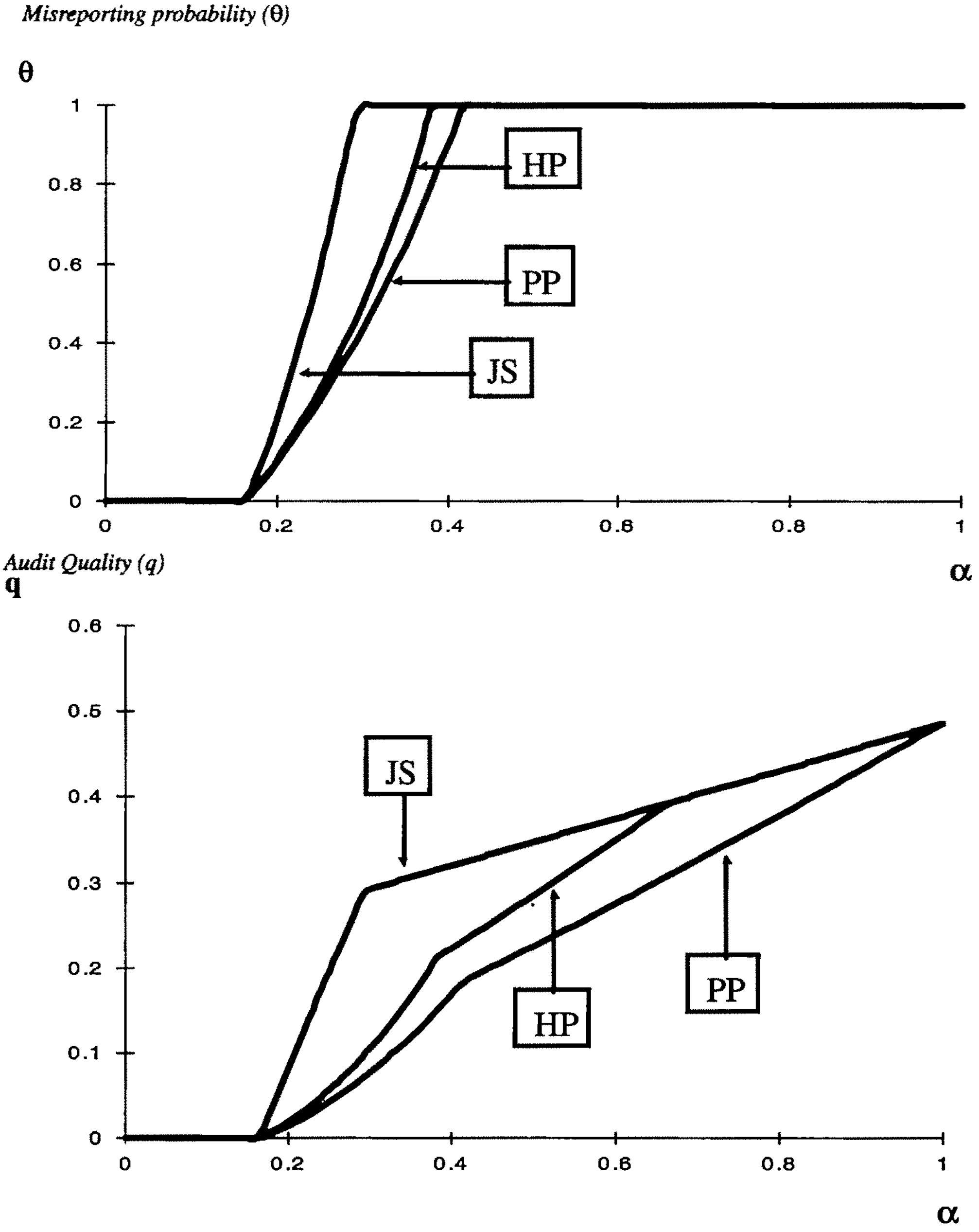
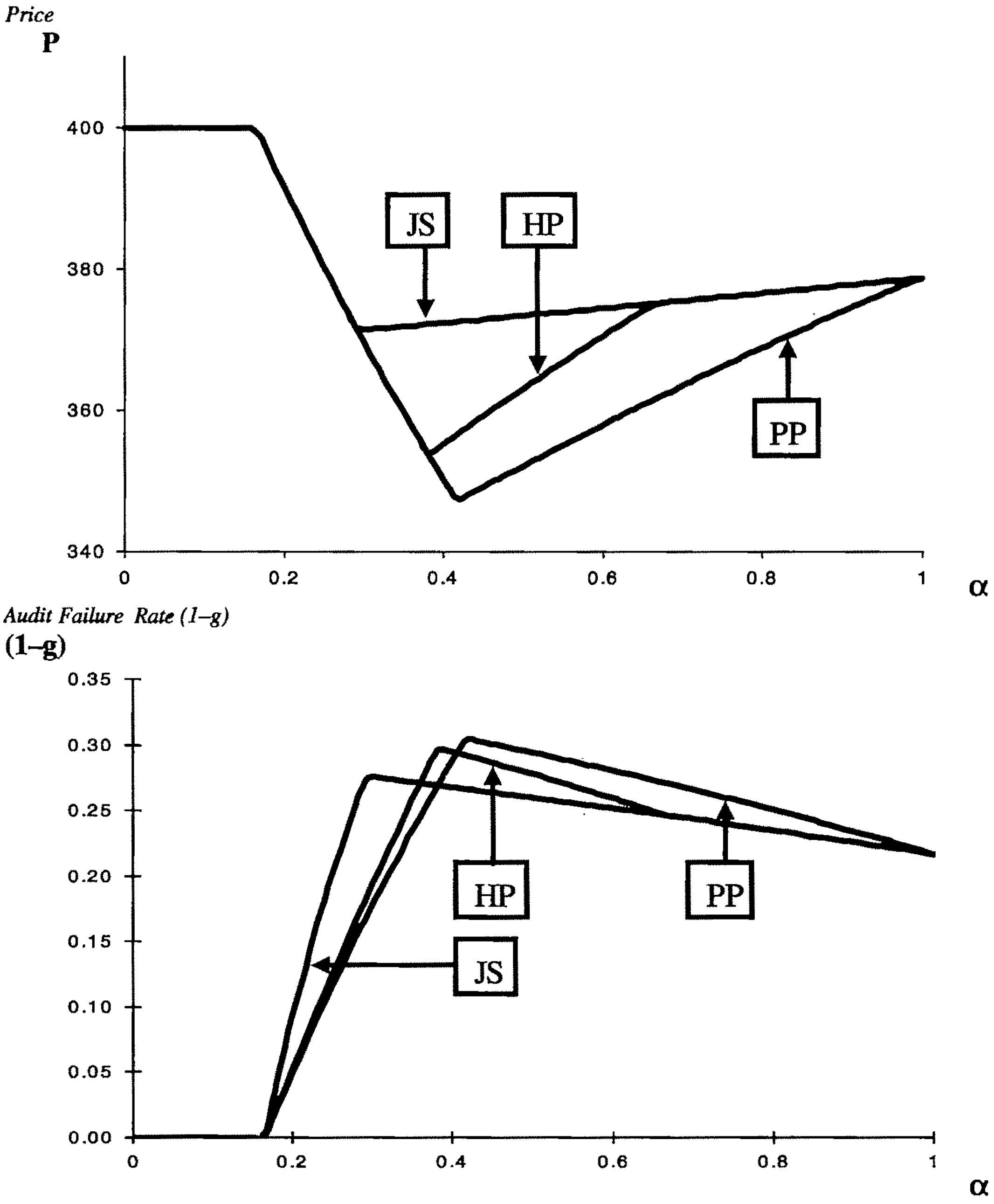


FIGURE 3
Price and the Audit Failure Rate



The intuition behind this result is the same as for Proposition 1: increasing the amount of owner insolvency insurance directly increases audit quality by increasing the auditor's expected marginal benefit from audit quality. It also raises the price by increasing the investors' expected payoff in the audit failure state. These initial increases in audit quality and price are reinforced because of their strategic complementarity. Since audit quality increases and there is no change in the amount of misreporting, the audit failure rate declines.

The next proposition examines what happens when the auditor is held responsible for a higher percentage of the damages in misreporting equilibria.[19]

Proposition 2: For $\alpha > \bar{\alpha}_2$, an increase in α leads to an increase in audit quality, an increase in the firm's price and a decrease in the audit failure rate under all three damage apportionment rules.

As with an increase in the amount of owner insolvency insurance, an increase in α has both a direct and indirect effect on audit quality and prices. It directly increases the level of audit quality by increasing the auditor's marginal benefit from audit quality holding price constant. It also directly increases the price that investors are willing to pay because it increases their expected litigation awards holding audit quality constant. These initial increases are indirectly reinforced because of the strategic complementarity between price and audit quality. Audit quality increases with price both because the total amount of damages has increased and because the liable auditor is being held responsible for a higher percentage of these damages. Price increases with audit quality both because the probability of an audit failure has decreased and the expected payoff in the event of an audit failure has increased.

The increase in audit quality increases the probability that the auditor detects an overstatement without changing the initial probability of an overstatement because the low-type owner's strategy is constant with respect to audit quality. Therefore, the increase in audit quality due to the increase in α leads to a decrease in the probability of an audit failure. As shown in the next section, this intuition does not carry over to situations where the owner's reporting strategy varies with the damage apportionment rule.

Interactive Analysis

In those equilibria in which the owner's optimal strategy is a mixed one, the owner's expected cost of misreporting, $M(\alpha)$, is the same under all three damage apportionment rules for a given α. Since the expected costs of misreporting have to equal the expected benefits of misreporting in order for the owner to be willing to play an interactive strategy, this implies that price as a function of α must also be the same under all three rules; that is, $P_{JS}(\alpha) = P_{HP}(\alpha) = P_{PP}(\alpha)$.

Investors will bid up the firm's price as the damage apportionment rule mandates more owner insolvency insurance, *ceteris paribus*. Likewise, the auditor will respond by supplying more audit quality because greater amounts of owner insolvency insurance raise the expected costs of an audit failure. Since price and audit quality still act as strategic complements holding all else constant, these effects will reinforce one another. However, any price increase due to more owner insolvency insurance will simultaneously increase the owner's incentives to misreport since the net benefits, $P - M(\alpha)$, would now be strictly positive. The resulting increase in the probability of misreporting reduces the firm's price by increasing the probability of an audit failure. In equilibrium, the likelihood of misreporting increases by just enough to counteract the upward pressure put on price by the higher levels of owner insolvency insurance.

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[19] Results similar to those in Propositions 2 and 4 also hold for an increase in λ, the probability that the jury holds the auditor liable. See Hillegeist (1998).

This intuition demonstrates the main theme of this paper: a change in the damage apportionment rule not only changes the auditor's incentives, but simultaneously and inseparably changes the owner's reporting incentives. This inseparability occurs because the auditor's and owner's incentives are endogenously linked through the price investors are willing to pay for the firm. These changes in incentives impact the audit failure rate in opposite directions and, in equilibrium, the change in the owner's reporting strategy more than offsets the change in audit quality in terms of the reliability and accuracy of the financial statements.

The interactive equilibria comparisons for the three damage apportionment rules are summarized in the following proposition. Let $\underline{\alpha}_2 = \min\{\alpha_2^{JS}, \alpha_2^{HP}, \alpha_2^{PP}\}$.

Proposition 3: For any $\alpha_1 < \alpha < \underline{\alpha}_2$, the audit failure rate, the probability of misreporting and audit quality are ranked as follows: $(1 - g_{JS}) > (1 - g_{HP}) > (1 - g_{PP})$, $\theta^*_{JS} > \theta^*_{HP} > \theta^*_{PP}$, and $q^*_{JS} > q^*_{HP} > q^*_{PP}$.

This proposition contains the main result of the paper. If the three damage apportionment rules are ranked on the basis of the audit failure rate they induce, then this ranking switches depending on whether the equilibria involve the low-type owner employing an interactive or a static reporting strategy. This reversal occurs despite the fact that under both types of equilibria, the JS rule leads to the highest level of audit quality and the PP rule leads to the lowest level. The difference comes from how the damage apportionment rule affects the owner's misreporting incentives in an interactive equilibrium: more owner insolvency insurance leads to more misreporting.[20]

This reversal in the ranking of the most policy-relevant variable in the paper demonstrates the importance of modeling the owner as an active player, especially in light of the evidence cited in the introduction regarding the interactive nature of the auditing/financial reporting relationship in practice. The model's implications for interactive equilibria are clear: the less misreporting the better. In terms of the damage apportionment rule, this translates into: the less owner insolvency insurance, the better. Thus, within the confines of the model, the PP rule is to be preferred to the HP rule which is to be preferred to the JS rule.

A small increase in the sharing parameter k under the HP rule produces a small increase in the amount of owner insolvency insurance, where "small" is defined so that the resulting equilibrium is still an interactive equilibrium. Thus, the effects and the intuition behind them are the same as those of Proposition 3, which analyzed the effects of relatively large changes in the amount of owner insolvency insurance. Since the expected costs of misreporting, $M(\alpha)$, are invariant to k, the equilibrium price cannot change with k in an interactive equilibrium. Therefore, the increase in price that the change in k would otherwise induce must be just offset by an increase in the owner's probability of misreporting. The net result is an increase in the audit failure rate.

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[20] In a substantially different setting, Nelson et al. (1988, Proposition 20) finds that more audit quality leads to the equivalent of more misreporting. However, in their setting, the increase in audit quality dominates and the net result is a decrease in the audit failure rate. This difference is likely due to their use of exogenous payoffs which breaks the endogenous link between the players' strategies modeled here.

Corollary 2: For any $\alpha_1 < \alpha < \alpha_2^{HP}$, a small increase in the sharing parameter **k** under the hybrid proportional rule leads to an increase in the audit failure rate, the probability of misreporting and audit quality.

This corollary continues the underlying theme of this paper: changing the incentives of the auditor by changing the amount of owner insolvency insurance the auditor provides simultaneously changes the owner's reporting incentives and that these changes affect the audit failure rate in opposite directions. This potential trade-off between the amount of misreporting and the quality of the audit has often been overlooked in debates concerning auditor liability and audit quality.

The next proposition describes what happens when there is a small increase in α.

Proposition 4: An increase in α to $\alpha + \Delta\alpha$ where $\alpha_1 < \alpha + \Delta\alpha < \underline{\alpha}_2$ leads to an increase in the audit failure rate, the probability of misreporting and audit quality, and a decrease in price under all three damage apportionment rules.

When α increases, the low-type owner's expected costs of misreporting decrease because the owner will be held responsible for a smaller percentage of the damages when the auditor is held liable. Therefore, the equilibrium price under an interactive equilibrium must also decline by the same amount in order for the owner to remain indifferent between the two reporting choices. The increase in α will lead to an increase in price and audit quality, holding the owner's reporting strategy constant. In the new equilibrium, the amount of misreporting must increase by more than enough to offset the effects that the increase in α and audit quality would otherwise have on price, so that the price will actually fall in equilibrium.

This result further demonstrates the importance of modeling the owner as an active player when the focus of the model is on the audit failure rate, and not just on audit quality. When the owner is a nonstrategic player, the audit failure rate is always decreasing with an increase in α because the amount of misreporting is invariant to α.[21]

V. EXTENSIONS

The economic setting was kept relatively simple in order to facilitate the analysis and the presentation of the results. The purpose of this section is to discuss several possible extensions of the model. It is relatively straightforward to show that as long as the owner's expected costs of misreporting, $M(\alpha)$, are monotonically decreasing in α, and the auditor's expected costs of an audit failure are increasing in both the amount of owner insolvency insurance provided and α, then the same qualitative results will be obtained. Extensions where these conditions are met include the introduction of uncertainty or business risk with respect to the firm's liquidating cash flows, a percentage of the damage awards going to class-action lawyers, pretrial settlements, and fractional recovery of damages.

The introduction of risk aversion for the owner and auditor should not change the nature of the underlying strategic interactions on which the qualitative results depend. When the owner is risk averse, $M(\alpha)$ will continue to be strictly decreasing in α, but the slope will change. Risk aversion on the part of the auditor will increase the differences in audit quality among the damage apportionment rules. This occurs because increases in the amount of owner insolvency risk that the auditor bears will be met with even greater increases in audit quality than in the risk-neutral setting.

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[21] An implication of Proposition 4 is that if juries become stricter with auditors, it could lead to the unintended result of more audit failures. This result is important because in a series of studies, the RAND Institute of Civil Justice has empirically documented that over the past few decades, juries have increasingly sided with plaintiffs and awarded higher damage awards in civil trials (Chin and Peterson 1985; Peterson 1987). Such behavior can be interpreted as increasing α (and λ) in this model.

One could also extend the model by fully endogenizing the expected damage awards by characterizing the jury's expected behavior in terms of audit quality; that is, $\alpha = \alpha(q)$ and $\lambda = \lambda(q)$.[22] Such an extension creates 12 additional parameters in the model (six values and their derivatives among the three damage apportionment rules). These new parameters introduce ambiguity into the results because of some "second order" effects that attenuate the differences among the legal regimes. At the expense of considerable mathematical complexity, sufficient conditions could be imposed that would eliminate this ambiguity so the results would remain qualitatively the same. Essentially, these conditions limit how responsive a jury is expected to be to changes in audit quality.

Note, however, that a contention upon which the current paper rests is that making the owner's reporting decision endogenous provides insights about alternative liability regimes that are not evident when the owner's reporting decision is exogenous. In the same light, future research may reveal additional insights about the effects of alternative liability regimes if the current model is expanded so that the probability of the auditor being held liable, λ, and the proportion of the damages for which a liable auditor will be held responsible, α, is allowed to depend upon audit quality.

VI. CONCLUSION

This paper analyzes how owners, auditors and investors behave under three alternative damage apportionment rules that are currently in use throughout the world. The analysis takes place within an economic setting where the players' payoffs are endogenously determined and auditing improves social welfare by decreasing the amount of negative NPV investments that are undertaken. The analysis contributes to the auditor liability literature by focusing on the crucial role that the owner's reporting strategy has on the results. Specifically, I find that when the owner plays a mixed reporting strategy, changes in the damage apportionment rule that increase the level of audit quality simultaneously increase the probability of misreporting by the owner. The net result of these two changes is an increase in the audit failure rate.

This finding, which is new to the auditor liability literature, is consistent with the observation that the accuracy of the financial statements is primarily the responsibility of management and auditors have only a secondary "quality control" role. This paper demonstrates the importance of recognizing the impact that damage apportionment rules have on both the auditor and the owner when debating their relative merits. This latter effect has often been overlooked in policy debates concerning auditor liability.

The level of audit quality is always highest (lowest) under the JS (PP) rule. However, the rank order of the damage apportionment rules in terms of the audit failure rate reverses itself depending on whether the owner employs a constant or a mixed reporting strategy. For equilibria where the owner plays a mixed reporting strategy, the PP (JS) rule leads to the lowest (highest) audit failure rate and vice versa for equilibria where the owner always misreports. The hybrid proportional rule leads to an intermediate level of audit quality and audit failures under both types of equilibria.

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[22] Although the expected decisions of the jury are exogenously fixed in the current model, the amount of damages is still determined endogenously through the investors' pricing decision.

The mixed reporting results are important for two reasons. First, empirical, experimental and practitioner evidence suggests that reporting strategies in the real world are influenced by auditing strategies and vice versa. Second, investors, regulators and auditors are primarily concerned with the audit failure rate rather than with audit quality *per se.* These results are likely to be of interest to state regulators and policy makers in the United Kingdom and other countries who are currently debating the merits of switching from a joint-and-several to a proportional damage apportionment rule.

APPENDIX A
NOTATION

α = percentage of responsibility the jury assigns to the auditor ($0 < \alpha < 1$).
λ = probability that the jury holds the auditor liable for an audit failure.
θ = the low-type owner's reporting strategy, where the owner misreports with probability θ and reports accurately with probability $(1 - \theta)$.
b = the probability that the owner is bankrupt at the end of the trial.
$c(q)$ = the auditor's incremental cost of providing audit quality q.
C_T = the end-of-period liquidating cash flow of a type T firm.
g = the probability that an audited high report is accurate in equilibrium.
$(1 - g)$ = the equilibrium audit failure rate.
k = the proportional damage multiplier under a HP rule ($1 < k < 1/\alpha$). $k = 1$ under a PP rule and $k = 1/\alpha$ under a JS rule.
$M(\alpha)$ = the low-type owner's expected costs of misreporting.
p = the *ex ante* probability that a firm is of high type.
P_j = the firm's price under damage apportionment rule j, $j \in \{JS, HP, PP\}$.
q = the equilibrium level of audit quality ($\underline{q} \le q \le 1$). Quality is defined as the probability that a material misstatement is detected if one exists.
$T \in \{H, L\}$ = value of the firm's assets (its type) where H = high and L = low.
$\hat{T} \in \{\hat{H}, \hat{L}\}$ = owner's report to the auditor where $\hat{H}$ = "high" and $\hat{L}$ = "low."
$\hat{t} \in \{\hat{a}, \hat{u}\}$ = auditor's opinion on $\hat{T}$ where $\hat{a}$ = "adverse" and $\hat{u}$ = "unqualified."

APPENDIX B
PROOFS

The proofs rely on how optimal audit quality responds to changes in several other variables. It will be useful to show these now. Equations (14), (8) and (15) characterize the auditor's optimal choice of audit quality under the JS, HP and PP rules, respectively. I claim that optimal audit quality is continuously increasing in P, α and θ for all three rules and in k under the HP rule, *ceteris paribus.* Let $F_j(\alpha, \theta_j, P_j)$ equal the RHS of the optimal audit quality equations (14), (8) and (15) for $j \in \{JS, HP, PP\}$. Thus, $c'(q_j^*(\alpha, \theta_j, P_j)) = F_j(\alpha, \theta_j, P_j)$. Then, $\partial c'(q_j^*(\alpha, \theta_j, P_j))/\partial\alpha = [\partial c'(q_j^*(\alpha, \theta_j, P_j))/\partial q_j^*] \cdot [\partial q_j^*(\alpha, \theta_j, P_j)/\partial\alpha] = \partial F_j(\alpha, \theta_j, P_j)/\partial\alpha > 0$. Since $c'(q)$ is an increasing function of q, this implies that $\partial q_j^*(\alpha, \theta_j, P_j)/\partial\alpha > 0$. Since the partial derivatives of F_j with respect to P_j and θ_j are also both positive and the partial derivative of F_{HP} with respect to k is also positive, the rest of the claim can be shown similarly.

Lemma 1a: $\alpha_2^{HP} \le \alpha_2^{PP}$. When either is in the interior, the inequality is strict.

Proof: If $\alpha_2^{HP} = \alpha_2^{PP} = 0$ or $\alpha_2^{HP} = \alpha_2^{PP} = 1$, then obvious.

Assume α_2^{HP} and α_2^{PP} are in the interior. From the owner's misreporting condition (equation (11)), we know that $P_{HP}(\alpha) = P_{PP}(\alpha) = M(\alpha)$ for $\alpha_1 < \alpha \le \underline{\alpha}_2$. Since $(b - \alpha bk\lambda) <$

$(b + \alpha b\lambda)$, the investors' pricing rules (equations [5] and [13]) imply that $g_{PP} > g_{HP} \Rightarrow \theta^*_{PP}(1 - q^*_{PP}) < \theta^*_{HP}(1 - q^*_{HP})$.

Suppose that $\alpha_2^{HP} \geq \alpha_2^{PP}$. Then at α_2^{PP}, $P_{HP} = P_{PP} \Rightarrow q^*_{PP} > q^*_{HP}$ since $\theta^*_{HP} \leq 1$ and $\theta^*_{PP} = 1$. From the optimal audit quality equations (8) and (15), when $P_{HP} = P_{PP} \Rightarrow q^*_{HP} > q^*_{PP}$. This is a contradiction. Therefore, $\alpha_2^{HP} \ngeq \alpha_2^{PP}$ when α_2^{HP} and α_2^{PP} are in the interior. A similar argument holds when either $\alpha_2^{PP} = 0$ and $\alpha_2^{HP} > 0$ or $\alpha_2^{HP} = 1$ and $\alpha_2^{PP} < 1$. ■

Lemma 1b: $\alpha_2^{JS} \leq \alpha_2^{HP}$. When either is in the interior, the inequality is strict.

Proof: The proof is similar to that of Lemma 1a. ■

Proposition 1: HP vs. PP. There are six different cases that can occur regarding P and q^* for $\alpha > \bar{\alpha}_2$. Case 1: Suppose $P_{HP} > P_{PP}$. Then the optimal audit quality equations (8) and (15) imply that $q^*_{HP} > q^*_{PP}$. Case 2: Suppose that $q^*_{HP} > q^*_{PP}$. Then the investors' pricing rules (5) and (13) imply that $P_{HP} > P_{PP}$. Case 3: Suppose $P_{HP} = P_{PP}$. Then the optimal audit quality equations (8) and (15) imply that $q^*_{HP} > q^*_{PP}$, but by case 2, this cannot happen. Therefore, $P_{HP} \neq P_{PP}$. Case 4: Suppose $q^*_{HP} = q^*_{PP}$. Then the investors' pricing rules 5 and 13 imply that $P_{HP} > P_{PP}$, but by case 1, this cannot happen. Therefore, $q^*_{HP} \neq q^*_{PP}$. Case 5: Suppose $P_{HP} < P_{PP}$. Then the optimal audit quality equations (8) and (15) imply that either $q^*_{HP} > q^*_{PP}$ or $q^*_{HP} < q^*_{PP}$. However, case 2 rules out $q^*_{HP} > q^*_{PP}$ when $P_{HP} < P_{PP}$. Case 6: Suppose $q^*_{HP} < q^*_{PP}$. Then the investors' pricing rules (5) and (13) imply that $P_{HP} > P_{PP}$ or $P_{HP} < P_{PP}$. However, case 1 rules out $P_{HP} > P_{PP}$ when $q^*_{HP} < q^*_{PP}$.

For the proposition to be true then, cases 5 and 6 must be shown to be false. By the above lemma, $\alpha_2^{HP} \leq \alpha_2^{PP}$. Thus, at α_2^{PP}, the investors' pricing equations (5) and (13) imply that $P_{HP} > P_{PP}$ which implies that $q^*_{HP} > q^*_{PP}$ by case 1. Therefore, for either case 5 or 6 to hold, there must exist some value of α, α', such that $P_{HP} = P_{PP}$ since $P_{HP}(\alpha_2^{PP}) \geq P_{PP}(\alpha_2^{PP})$ and both pricing equations are continuous in α. However, by case 3, $P_{HP} \neq P_{PP}$ which implies that $P_{HP} \nleq P_{PP}$ and by extension, $q^*_{HP} \nleq q^*_{PP}$. When $\theta^* = 1$, the audit failure rate $(1 - g)$ is decreasing in q so $q^*_{HP} > q^*_{PP}$ implies that $(1 - g_{HP}) < (1 - g_{PP})$.

A similar argument holds for JS vs. HP and JS vs. PP. ■

Corollary 1: When $\alpha > \alpha_2^{HP}$, $\theta^*_{HP} = 1$. When $\theta^*_{HP} = 1$, the optimal audit quality equation (8) implies that when price is held constant, optimal audit quality is increasing in k. Additionally, it implies that when k is held constant, optimal audit quality is increasing in price. The investors' pricing equation (5) shows that holding audit quality constant, price is increasing in k and that holding k constant, price is increasing in audit quality. Taken together, these show that both equilibrium audit quality and price are strictly increasing with k. Additionally, when $\theta^*_{HP} = 1$, the audit failure rate, $(1 - g)$, is strictly decreasing in audit quality. ■

Proposition 2: When $\alpha > \bar{\alpha}_2$, $\theta^*_{JS} = \theta^*_{HP} = \theta^*_{PP} = 1$. The optimal audit quality equations (8), (14) and (15) imply that when price is held constant, optimal audit quality is increasing in α. Additionally, they imply that when α is held constant, optimal audit quality is increasing in price. The investors' pricing equations (5), (12) and (13) show that holding audit quality constant, price is increasing in α and that holding α constant, price is increasing in audit quality. Taken together, these show that equilibrium audit quality and price are strictly increasing in α under all three rules. Additionally, the audit failure rate, $(1 - g)$, is strictly decreasing in audit quality. ■

Proposition 3: HP vs. JS: For any $\alpha_1 < \alpha < \underline{\alpha}_2$, $P_{JS} = P_{HP} = M(\alpha)$. Since $(b - \alpha bk\lambda) > (b - b\lambda)$, the investors' pricing equations (12) and (5) imply that $g_{HP} > g_{JS}$, which implies that $(1 - g_{JS}) > (1 - g_{HP})$. This in turn implies that $\theta^*_{HP}(1 - q^*_{HP}) < \theta^*_{JS}(1 - q^*_{JS})$. At α_2^{JS}, $P_{JS}(\alpha_2^{JS}) = P_{HP}(\alpha_2^{JS}) = M(\alpha_2^{JS})$ and by definition of α_2^{JS}, $\theta^*_{JS} = 1$ and from lemma 1b, $\theta^*_{HP} < 1$. Together, these imply that $q^*_{JS} > q^*_{HP}$ at α_2^{JS}.

For ease of notation, let $\underline{q} = 0$. At α_1, $q^*_{HP} = q^*_{JS} = 0$ and $\theta^*_{HP} = \theta^*_{JS} = 0$. Therefore, if there exists some α' where $q^*_{HP} > q^*_{JS}$ or $\theta^*_{HP} > \theta^*_{JS}$, then there must exist some other $\alpha'' > \alpha'$ where $q^*_{HP} = q^*_{JS}$ or $\theta^*_{HP} = \theta^*_{JS}$ since at α_2^{JS}, $q^*_{JS} > q^*_{HP}$ and $\theta^*_{JS} > \theta^*_{HP}$.

Suppose $q^*_{HP} = q^*_{JS}$ at α''. Then since $P_{JS}(\alpha'') = P_{HP}(\alpha'')$, the investors' pricing equations (12) and (5) imply that $g_{HP} > g_{JS} \Rightarrow \theta^*_{JS} > \theta^*_{HP}$. When $q^*_{HP} = q^*_{JS}$, the right-hand sides of the optimal audit quality equations (14) and (8) must be equal. With $P_{JS} = P_{HP}$, this implies that $\theta^*_{HP} > \theta^*_{JS}$, which is a contradiction. Therefore, it must be that $q^*_{JS} > q^*_{HP}$ for $\alpha_1 < \alpha < \alpha_2^{JS}$.

Suppose that $\theta^*_{HP} = \theta^*_{JS}$ at α''. Then since $P_{JS}(\alpha'') = P_{HP}(\alpha'')$, the investors' pricing equations (12) and (5) imply that $g_{HP} > g_{JS} \Rightarrow q^*_{HP} > q^*_{JS}$ when $\theta^*_{JS} = \theta^*_{HP}$. But from above, this is a contradiction since $q^*_{JS} \not\leq q^*_{HP}$ for $\alpha_1 < \alpha < \alpha_2^{JS}$. Therefore, it must be that $\theta^*_{JS} > \theta^*_{HP}$ for $\alpha_1 < \alpha < \alpha_2^{JS}$.

Similar arguments hold for PP vs. HP and PP vs. JS. ■

Corollary 2: For $\alpha_1 < \alpha < \alpha_2^{HP}$, $P_{HP}(\alpha)$ equals $M(\alpha)$ under the HP rule. When k increases, $M(\alpha)$ remains the same so that the equilibrium price must also remain constant. From the investors' pricing equation (5), this implies that g must decrease, since the increase in k increases price when g is held constant. A decrease in g implies that the audit failure rate, $(1 - g)$, is higher. For this to happen, the proof to Proposition 3 implies that θ and audit quality must be higher in equilibrium. ■

Proposition 4: For $\alpha_1 < \alpha < \underline{\alpha}_2$, $P(\alpha)$ equals $M(\alpha)$ under all three rules. When α increases, $M(\alpha)$ decreases so that the equilibrium price must also decrease. From the investors' pricing equations (5), (12) and (13), this implies that g must decrease under all three damage apportionment rules. A decrease in g implies that the audit failure rate, $(1 - g)$, is higher. For this to happen, the proof to Proposition 3 implies that θ and audit quality must be higher in equilibrium. ■

REFERENCES

American Institute of Certified Public Accountants (AICPA). 1983. *Audit Risk and Materiality in Conducting an Audit.* Statement of Auditing Standards No. 47. New York, NY: AICPA.

———. 1997. *Consideration of Fraud in Financial Statements.* Statement of Auditing Standards No. 82. New York, NY: AICPA.

Arthur Andersen, Coopers & Lybrand, Deloitte & Touche, Ernst & Young, KPMG Peat Marwick, and Price Waterhouse. 1992. *The Liability Crisis in the United States: Impact on the Accounting Profession; A Statement of Position.* New York, NY: Arthur Andersen, Coopers & Lybrand, Deloitte & Touche, Ernst & Young, KPGM Peat Marwick, and Price Waterhouse.

Chin, A., and M. Peterson. 1985. *Deep Pockets, Empty Pockets: Who Wins in Cook County Jury Trials.* Santa Monica, CA: RAND Institute of Civil Justice.

Datar, S., J. Feltham, and J. Hughes. 1991. The role of audits and audit quality in valuing new issues. *Journal of Accounting and Economics* 14 (March): 3–49.

Dopuch, N., D. Ingberman, and R. King. 1997. An experimental investigation of multi-defendant bargaining in "joint-and-several" and proportionate liability regimes. *Journal of Accounting and Economics* 23 (July): 189–221.

———, R. King, and J. Schatzberg. 1994. An experimental investigation of alternative damage-sharing liability regimes with an auditing perspective. *Journal of Accounting Research* 32 (Supplement): 103–130.

Dye, R., B. Balachandran, and R. Magee. 1990. Contingent fees for audit firms. *Journal of Accounting Research* 28 (Fall): 239–266.

———. 1993. Auditing standards, legal liability, and auditor wealth. *Journal of Political Economy* 101 (5): 887–914.

———. 1995. Incorporation of the audit market. *Journal of Accounting and Economics* 19 (February): 75–114.

Fellingham, J., and P. Newman. 1985. Strategic considerations in auditing. *The Accounting Review* 60 (October): 634–650.

Hanson, S., and J. Watts. 1997. Two models of the auditor-client interaction: Tests with United Kingdom data. *Contemporary Accounting Research* 14 (Summer): 23–50.

Hillegeist, S. 1998. Financial reporting and auditing under alternative legal regimes. Ph.D. dissertation, University of California at Berkeley.

Hirst, E. 1994. Auditor sensitivity to earnings management. *Contemporary Accounting Research* 11 (Fall): 405–422.

King, R., and R. Schwartz. 1997. The Private Securities Litigation Reform Act of 1995: A discussion of three provisions. *Accounting Horizons* 11 (March): 92–106.

Melumad, N., and L. Thoman. 1990. On auditors and the courts in an adverse selection setting. *Journal of Accounting Research* 28 (Spring): 77–120.

Narayanan, V. 1994. An analysis of auditor liability rules. *Journal of Accounting Research* 32 (Supplement): 39–64.

Nelson, J., J. Ronen, and L. White. 1988. Legal liabilities and the market for auditing services. *Journal of Accounting, Auditing, and Finance* 3 (Summer): 255–295.

Newman, P., and J. Noel. 1989. Error rates, detection rates, and payoff functions in auditing. *Auditing: A Journal of Practice & Theory* (Supplement): 50–63.

Pae, S. 1996. Firm value, audit quality, and social welfare in the presence of costly litigation against auditors. Ph.D. dissertation, University of British Columbia.

Palmrose, Z-V. 1994. The joint & several vs. proportionate liability debate: An empirical investigation of audit-related litigation. *Stanford Journal of Law, Business & Finance* 1: 53–72.

Peterson, M. 1987. *Civil Juries in the 1980s: Trends in Jury Trials and Verdicts in California and Cook County, Illinois.* Santa Monica, CA: RAND Institute of Civil Justice.

Schwartz, R. 1997. Legal regimes, audit quality, and investment. *The Accounting Review* 72 (July): 385–406.

Shibano, T. 1990. Assessing audit risk from errors and irregularities. *Journal of Accounting Research* 28 (Supplement): 110–140.

———. 1994. Overguarding the guardians: Increasing auditor liability decreases new investment. Forthcoming in *Journal of Accounting and Economics.*

United States Congress. 1995. *Public Law 104-67: Private Securities Litigation Reform Act of 1995.* Washington, D.C.: Printing Office.

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Managing Annual Accounting Reports to Avoid State Taxes: An Analysis of Property-Casualty Insurers

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ABSTRACT: We hypothesize that, in their annual accounting reports, property-casualty insurers allocate premiums from multistate policies to reduce total state taxes. To test this prediction, we exploit the industry's unique state tax disclosures. We examine firm-level data, collected from the publicly available, statutory reports filed with each state government. Reported premiums at the insurer-state level, scaled by incurred losses, are regressed on state tax measures. Consistent with tax-motivated income shifting, we find the premium-loss ratio is decreasing in state tax rates. The negative relation is greatest for insurers specializing in multistate lines of business.

Key Words: *Accounting reports, State taxation, Property-casualty insurance companies, Income shifting.*

Data Availability: *Data are commercially available from the sources identified in the text.*

I. INTRODUCTION

This paper extends our understanding of cross-jurisdictional tax planning by examining reporting patterns in insurers' annual accounting reports filed with state insurance regulators. The reporting pattern we observe is consistent with tax-motivated income shifting. Specifically, our findings are consistent with property-casualty insurers avoiding state taxes through the strategic allocation of premiums across the statutory reports they

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file with each state in which they operate. Our findings add to the growing literature (e.g., Klassen et al. 1993; Harris 1993; Grubert et al. 1993; Harris et al. 1993; Jacob 1996; Collins and Shackelford 1997; Collins et al. 1997; Klassen and Shackelford 1998) that shows companies shift their tax bases across jurisdictions through allocations of income and expenses among commonly controlled companies.

In their annual statutory reports, insurers are required to allocate premiums and losses from multistate policies across states. These filings determine the taxes paid to each state. We hypothesize that insurers allocate premiums to reduce total state taxes. To test this prediction, reported premiums at the insurer-state level, scaled by incurred losses, are regressed on state tax measures. If allocations are managed to avoid taxes, we anticipate an inverse relation between the tax rate and the premium-loss ratio. Firm-specific premium-loss ratios are computed using information from the annual regulatory reports filed with each state in which an insurer underwrites. Primary analysis is conducted on 12,573 insurer-state observations from 1993.[1]

Consistent with income shifting to avoid state taxes, we find the premium-loss ratios of property-casualty insurance are decreasing in state tax rates. The results are consistent with multistate insurers managing their annual accounting reports to shift premiums to more favorably taxed states. Further analysis finds that insurers providing coverage for multistate activities (e.g., commercial multiple peril) engage in tax avoidance while insurers limited to single state coverage (e.g., homeowners) do not.

The incremental contribution of this paper arises from two features of its research design. First, the property-casualty insurance industry facilitates the construction of tests that should control better for nontax considerations and should produce more precise estimates of tax avoidance. Unlike prior studies, we focus solely on the tax management of a specific account in a single industry and examine data from actual tax returns filed with multiple governments.[2] In addition, unlike the taxation of other industries, a state can apply different tax rates to insurers that are identical except for their state of incorporation. These "retaliatory" taxes, which are detailed below, create a range of tax rates within a state and mitigate the identification problems that typically thwart transjurisdictional tax research. In particular, the retaliatory taxes aid in our ability to distinguish between state tax effects and other state-specific factors.

The second incremental contribution of this paper is that its research design enables us to enhance our estimates of income shifting by explicitly considering possible implicit tax effects. To our knowledge, this is the first paper to incorporate implicit tax effects into estimates of income shifting.

The findings in this paper should interest state tax officials, insurance regulators, and accounting and tax scholars. With regard to state tax officials, the regression coefficients permit us to estimate the revenue effects of income shifting. The coefficients imply that insurers would respond to a standard deviation increase in state effective tax rates by understating the premium-loss ratios they report to state regulators and tax officials from 1.7 percent to 2.2 percent, depending on the extent of implicit taxes. When the analysis is restricted to insurers specializing in multistate lines of business, the estimates increase to

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[1] If insurer i (regardless of its state of incorporation) conducts business in two states, j and k, two insurer-state observations exist, insurer i in state j and insurer i in state k. Robustness checks, detailed further in the text, provide no evidence that the results are sensitive to our selection of 1993.

[2] Collins, Kemsley, and Shackelford (1997) specify the industry and the account through which tax avoidance is hypothesized, but they are limited to tax return data from a single government (U.S.).

3.0 percent to 3.5 percent. The regression coefficients further indicate that cross-state premium shifting lowered the property-casualty insurance industry's total state tax burden by approximately $75 million or $32,000 for every U.S. property-casualty insurer, on average. These tax savings are approximately 2.5 percent of the total annual state taxes paid by property-casualty insurers. We conclude that the tax savings are nontrivial but that insurers do not substantially erode any state's tax base through premium shifting.

The extent of tax management also should interest regulators and academics who rely on the annual reports to assess the insurer's financial strength and, in some states, establish premium-loss ratios for insurance products. The findings indicate that profitability measures from the accounting reports are overstated (understated) in states with low (high) premium taxes.

The paper is organized as follows: The next section provides institutional background about state taxation of insurance companies. Section III develops a testable hypothesis. Section IV outlines the research design. Sections V and VI detail the paper's findings. Concluding remarks follow in section VII.

II. STATE TAXATION OF PROPERTY-CASUALTY INSURERS

Each insurer files an annual statement in each state in which it operates. These regulatory reports follow statutory accounting principles as developed by the National Association of Insurance Commissioners (NAIC) and include a balance sheet, a statement of income and many supplemental schedules and exhibits. Schedule T (Exhibit of Premiums Written—Allocated by States and Territories) includes direct premiums earned and direct losses incurred by state. Besides providing information for regulators and analysts, the statutory reports also are used to compute tax bases for state taxes.[3] The empirical tests in this paper are designed to learn whether insurers manage the cross-state allocations of premiums and losses in Schedule T to reduce overall tax costs.

Four states (Florida, Illinois, New Hampshire and New York) tax the income of all property-casualty insurance companies writing within their borders. Connecticut, Kansas and Oregon tax only the income of insurers incorporated in their states. The remaining states (and Connecticut, Kansas and Oregon if the insurer is incorporated outside their borders) tax insurers' premiums.[4]

A unique feature of insurance company taxation, known as "retaliatory" taxes, enables states to tax foreign insurers (i.e., those incorporated outside the state) more heavily than domestic insurers (i.e., those incorporated in the state). Because of retaliatory taxes, states apply different tax rates to the premiums generated (or income earned) within their borders depending on the insurer's state of domicile. Assume state i's tax rate on premiums is α and the premium tax rate in insurer j's state of incorporation is β. The percentage of premiums written in state i that insurer j remits in taxes to state i is the greater of α or β. In other words, retaliatory taxes permit low-tax states to retaliate against insurers from high-tax states by levying the high-tax premium tax rate found in the foreign insurer's home state against the foreign insurer's premiums generated in the low-tax state.

Understanding retaliatory taxes is important for understanding the research design in this study because 95 percent of our sample observations involve foreign insurers. In particular, because the tax rates applied within states vary depending on the domicile of the insurer, retaliatory taxes allay concerns that state tax effects may be inseparable from other state-specific factors. For example, annual premium-loss ratios in southeastern states likely are affected by the extent of hurricane damage. Without retaliatory taxes, distinguishing between the effects of hurricane activity and taxation on premium-loss ratios in southeastern states could be difficult. Retaliatory taxes facilitate identification because insurers in these states face a range of premium tax rates depending on their domicile. At the same time, insurers from high-tax states may face retaliatory taxes in many states, compressing the range of tax rates that they face across the country and limiting their opportunities to lower taxes through income shifting.

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[3] State taxes are not trivial. Petroni and Shackelford (1995) report that in 1990 the industry paid more to the states ($7 billion) than to the U.S. Federal government ($5.7 billion).

[4] Some states tax both income and premiums and then permit one tax to be credited against the other tax. Private discussions with state revenue officials reveal that insurers in these states effectively face only the income or the premium tax. Consequently, no states in this study are treated as though both premium and income taxes apply.

III. HYPOTHESIS DEVELOPMENT

Understatement of total premiums is not a primary tax avoidance option because state revenue officials can measure total premiums earned and total premiums reported with considerable precision. However, premium taxes and income taxes encourage insurers to report premiums in states where the tax burden is lighter. This paper tests whether premium shifting is an important tax avoidance strategy for property-casualty insurers. Income taxes also encourage insurers to shift losses to states with income taxes and particularly states with heavy income tax burdens. However, loss shifting across states is likely a limited tax strategy because state auditors can usually identify the state where a loss occurs.

Tax avoidance through shifting premiums is facilitated by the industry's reliance on inherently imprecise accounting allocations in the preparation of the statutory reports' Schedule T. For single-state policies, the reporting process is straightforward. If the policy is sold in the same state where the property is located and the insurer is incorporated, that state has sole authority to tax the policy's premiums. For multistate policies, insurers must allocate premiums across the states involved in the transaction. For example, if a group of affiliated hospitals in different states purchases a medical malpractice policy, the insurers must allocate the policy's income across the states where the hospitals are located and where the policy is sold. Insurers specializing in business lines with more multistate policies likely have greater opportunities to avoid insurer taxes than other insurers because their reports rely more heavily on the Schedule T allocation.

States provide little guidance concerning the allocation process. The process is sufficiently murky that Harrington (1984, 614) contends any state allocations "depend on arbitrary assumptions that might make the resulting figures meaningless." Private discussions with state revenue officials suggest tax audits primarily focus on determining whether all premiums are reported in some state. The allocations across states, which enable income shifting and are the focus of this study, reportedly receive less attention. Limited allocation regulations and enforcement lead to the paper's hypothesis, stated in its alternative form:

> **H1:** The premium-loss ratios that multistate insurers report to state tax authorities are decreasing in the marginal tax rate applied to their premiums in the state.

Despite several factors suggesting Schedule T allocations are conducive to tax management, a countervailing implicit tax effect—inducing a positive relation between premium-loss ratios and taxes—biases against finding tax avoidance in this setting. Theoretically (assuming competitive conditions, insurer mobility across states and no tax-motivated management of the Schedule T allocations) the price of insurance should be bid up (down) in states that tax property-casualty insurers less (more) favorably until the after-tax, risk-adjusted returns to providing coverage are identical across all states. To achieve such equality, before-tax returns must increase in state tax levies (Scholes and Wolfson 1992). To the extent premiums and losses reflect adjustments in before-tax returns, our estimates of tax-motivated income shifting will be understated.

The extent to which implicit tax effects arise is an empirical question beyond the scope of this study.[5] However, to augment our assessment of multistate income shifting, we incorporate the possible effects of implicit taxes in our analysis. Because the possible implicit tax effects force premium-loss ratios in a direction contrary to that predicted by income shifting, the inclusion of potential implicit tax effects in our measures should provide an upper bound for income shifting. Fully ignoring implicit taxes should provide a lower bound.

IV. RESEARCH DESIGN

Dependent Variable

To determine whether multistate insurers avoid state taxes through strategic allocations in the statutory reports, we regress premium-loss ratios (PLR) for each insurer-state observation on measures of state taxes, controlling for previously documented premium-loss ratio determinants at the state-level and at the insurer-level:

$$\begin{aligned} \mathrm{PLR}_{ij} = {} & \beta_0 + \Sigma\beta_{1,k} \text{ tax measures}_{ijk} + \Sigma\beta_{2,k} \text{ control variables}_{jk} \\ & + \Sigma\beta_{3,k} \text{ control variables}_{ik} + \varepsilon_{ij} \end{aligned} \tag{1}$$

for all insurers i and states j.

The dependent variable, PLR, is insurer i's premiums less policyholder dividends divided by losses incurred (including estimated unpaid claims at year-end) in state j, as reported in Schedule T of the annual regulatory reports. This premium-loss ratio is recognized within the insurance industry as the *ex post* price of a dollar of coverage. A superior dependent variable would be the *ex ante* price of insurance; however, we are unaware of data that would permit us to compute *ex ante* prices.

For the insurers that do not face income taxation in a particular state, an ideal dependent variable would include only premiums because losses do not affect tax liabilities in those states. However, if the sample is restricted to those insurer-state observations in which the insurer is subject only to taxes on its premiums and premiums are used as the dependent variable, a scalar is needed to control for heteroskedasticity, and the most appropriate scalar is losses. Thus, the premium-loss ratio probably is the best dependent variable for assessing premium tax avoidance. Moreover, for the insurer-state observations in which the insurer is subject to income taxes, losses are the largest deduction. The ratio also controls for the possibility that some premiums are inseparable from their associated losses for shifting purposes and thus are of limited use in avoiding income taxes. On the other hand, to the extent insurers mask premium tax avoidance by shifting both losses and premiums, our premium-loss ratio measure diminishes the power of the tests to detect premium tax management.

Tax Variables

The ideal tax measure is the marginal tax rate each property-casualty insurer faces in every state where it conducts business. Unfortunately, the data do not permit such fine calibrations. Instead, we employ two alternative measures to approximate marginal tax rates: the effective (or average) state tax rate on insurers and the statutory (premium and income) tax rates. Negative coefficients on the tax measures are consistent with tax management of the annual statements.

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[5] Empirical tests of implicit taxes have been both difficult and inconclusive (see review in Erickson and Maydew [1998]). To our knowledge, no study documents whether implicit taxes affect the insurance prices. One difficulty with such a study would be measuring the price of a unit of insurance. Insurance products are not homogeneous, and machine-readable data sources, such as the one used in this study, are collected from insurer self-reported filings, which are potentially influenced by reporting incentives, such as those examined in this study.

The first tax measure is the effective tax rate (ETR) in each state, i.e., the total taxes collected from all insurers within the state as a percentage of total premiums. Petroni and Shackelford (1995) employ this tax measure because it enables them to convert various state systems for taxing insurers to one comparable measure. Unfortunately, ETR masks cross-insurer rate differences within a state and includes taxes and premiums from life and health insurance companies. Petroni and Shackelford (1995), however, assert that the inclusion of life and health insurers should not materially affect inferences because states tax the two sectors similarly. ETR also includes retaliatory taxes. Because retaliatory taxes are decreasing in state statutory rates, the inclusion of retaliatory taxes in ETR understates the variation in tax rates across states, reducing the power of the tests.[6]

Finally, ETR includes both premium and income taxes. To provide some segregation of the income tax effects imbedded in ETR, a variable indicating the presence of an income tax in the state (INCDUM) is included in the regressions using ETR as an explanatory variable. No prediction is advanced for INCDUM because it is unclear whether premium-loss ratios are lower in income tax states or premium tax states.

The second set of tax measures provides more precise segregation of premium tax and income tax effects. They are the statutory premium tax rates (PREMRATE) and the statutory income tax rates (INCRATE) applicable to each property-casualty insurer-state. To the extent tax bases and tax credits vary across states, statutory tax rates measure marginal tax rates with error. A casual review of state tax systems suggests that states vary along both dimensions. In particular, 16 states provide rate reductions if insurers invest substantially in state securities, employ state residents, establish regional offices in the state, etc. If the insurer is incorporated in the state, we assume the insurer qualified for the most favorable tax rate available. In all other cases, we assume the insurer did not qualify for any rate reduction.[7]

No matter whether the effective tax rate or the statutory tax rate is used, we attempt to incorporate insurers' unique retaliatory tax structure in the tax measure. The insurer-state tax rate for ETR, PREMRATE and INCRATE is the greater of the tax rate in the state where the insurance is sold or the tax rate in the state where the insurer is incorporated.[8] In other words, ETR for an insurer-state observation is the greater of the effective tax rate in the state where the policy is written or the effective tax rate in the state where the insurer is incorporated. For example, the Michigan ETR used in this study (i.e., total taxes collected from all insurers within Michigan as a percentage of total Michigan premiums) is 0.61 percent. The Ohio ETR is 1.31 percent. For observations involving a Michigan insurer (i.e., an insurer incorporated in Michigan) writing policies in Michigan, the tax rate used in this paper's tests is 0.61 percent. For observations involving an Ohio or Michigan insurer writing policies in Ohio or for observations involving an Ohio insurer writing policies in Michigan, the tax rate used in the regression is 1.31 percent.

The lower a state's tax rate, the greater the variation of tax rates assessed on policies written in its borders. Fifty-one different tax rates (50 states plus the District of Columbia) would apply to policies written in the state with the lowest tax rate if insurers from all states provided coverage there (assuming all states have different ETRs). All policies written in the state with the highest tax rate face the same tax rate.

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[6] Recall retaliatory taxes arise when foreign insurers from more heavily taxed domiciles write policies in less heavily taxed states. Thus, retaliatory taxes are greatest in low-tax states, narrowing the spread between effective tax rates in low-tax states and high-tax states.

[7] Inferences are unchanged if the average of the maximum statutory tax rate and the most favorable statutory tax rate is used.

[8] Five percent of the sample involves observations from the insurer's state of incorporation.

State-Specific Control Variables

A large literature has investigated the nontax determinants of premium-loss ratios. Several control variables are included in the paper's regressions to ensure that these nontax determinants do not affect our inferences about the effects of state taxes on premium-loss ratios. The first set of control variables addresses cross-state variation in premium-loss ratios.

Two variables are used to control for the effects of product sales regulation on premium-loss ratios.[9] The first regulatory control variable is RATEREG, a categorical variable indicating whether the state is one of the 26 that regulate insurance rates. The second regulatory control variable is RESTRICT, which ranks each state from one to 51, based on Conning & Company's survey of insurance managers in 1991. The survey assesses the relative freedom among states to manage personal and commercial lines of business. The higher the ranking, the more restrictions the state places on insurers' ability to design, price and market their products.

Negative coefficients are expected on RATEREG and RESTRICT. In his survey of the numerous empirical studies evaluating the effects of state regulation on premium-loss ratios, Harrington (1984) concludes that the evidence is generally consistent with insurance rates decreasing in the stringency of state regulatory oversight. Similarly, Vines (1996) reports that customers in rate-regulated states bore less of the industry's federal income tax increase following the Tax Reform Act of 1986 than did customers in other states.

A negative relation between PLR and RATEREG is expected because insurers have incentives to manage the statutory reports to appear less profitable in rate-regulated states. Regulators use the same financial information that determines tax bases to evaluate an insurer's profitability. In high-tax, rate-regulated states, the tax and regulatory incentives are aligned to encourage premium understatement. In low-tax, rate-regulated states, tax and regulatory incentives conflict.[10] To our knowledge, regulation is the sole nontax factor potentially impeding tax avoidance in this setting. However, sensitivity tests, detailed below, find no evidence that insurers trade off regulatory and tax considerations.

NOFAULT is a categorical variable indicating whether the state is one of the 14 with no-fault automobile coverage. Because Witt and Urrutia (1983) find the premium-loss ratios for automobile insurance is less in states with no-fault insurance, a negative coefficient is expected for NOFAULT.

INSPOP is number of insurers per 1,000 people in the state. Browne and Hoyt (1995) find that a 10 percent reduction in the number of property-casualty insurers results in an 82 percent reduction in the industry's insolvency rate. They interpret this finding as evidence that fewer insurers result in less competition and higher premium-loss ratios. To the extent INSPOP captures competition, its coefficient is expected to be negative.

Insurer-Specific Control Variables

The remainder of the control variables addresses cross-insurer variation in premium-loss ratios. DIRWRITE is a categorical variable indicating whether the insurer directly sells its policies, as opposed to using independent agents. Several studies (e.g., Joskow 1973; Cummins and VanDerhei 1979; Cummins et al. 1980; Witt and Miller 1981) report premium-loss ratios decrease in the presence of direct writers. Accordingly, a negative coefficient on DIRWRITE is expected.

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[9] Product sales regulations include prior approval of rates and guidelines concerning trade practices, insurance policies and contracts, advertising, marketing, cancellation of policies, and other operating practices.

[10] See Scholes et al. (1990), Collins et al. (1995), Beatty et al. (1995) and Collins, Geisler, and Shackelford (1997) for examples of studies addressing the coordination of multiple incentives, including taxes, regulatory capital and earnings.

SIZE is the natural logarithm of the insurer's admitted assets.[11] Larger insurers can accept lower premium-loss ratios because they can amortize their fixed costs over a larger pool and diversify their risks more easily. Thus, PLR is expected to be decreasing in SIZE.

Sommer (1996) reports a positive relation between the premium-loss ratio ratios and the insurer's capitalization and a negative relation between premium-loss ratio ratios and the insurer's investment portfolio volatility.[12] He infers from these relations that premium-loss ratio ratios are decreasing in an insurer's solvency risk. To control for such effects, the regression includes two measures of solvency risk. CAPITAL is an insurer's statutory surplus divided by its total admitted assets. PORTRISK is the percentage of an insurer's assets in more volatile investments, namely equity, unoccupied real estate and mortgage loans.[13] PLR is predicted to be increasing in CAPITAL and decreasing in PORTRISK.

The final controls represent an attempt to control for possible differences in premium-loss ratio ratios across lines of insurance. Each insurer's property-casualty premiums are grouped by eight major lines of business: multiple peril, automotive, product and other liability, medical malpractice, worker's compensation, reinsurance, credit and surety, and accident and health. All remaining lines of business are combined in a miscellaneous category. A variable for each line of business, except multiple peril, is included in the regression. The variables represent the percentage of the insurer's total premiums that come from that specific line of business.

Sommer (1996) finds that premium-loss ratios are increasing in the percentage of business in long-tailed lines, i.e., insurance policies where the spread between the receipt of the premium and the payment of the claim is greatest. Because the length of the insurance-claim tail varies across lines of business, the line variables are designed to control for tail variation and other sources of variation across lines. Consistent with Sommer (1996), we expect that the coefficients on the lines of business with the longest claim tails (e.g., product and other liability and medical malpractice) exceed the coefficients on the other lines of business.

Data and Sample

Each insurer's financial data, state of incorporation, and the number of insurers operating in each state are collected for 1993 from the NAIC Property/Casualty Annual Statement Database.[14] Each state's total taxes collected from insurance companies are gathered from the NAIC *1993 Insurance Department's Resources Report* (NAIC 1994). Information regarding state taxation of insurance companies is gathered from the NAIC (1992) publication, *Retaliation: A Guide to Retaliatory Taxes, Fees, Deposits, and Other Requirements*. Information regarding the state regulation of insurance prices is collected from an NAIC

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[11] Total admitted assets are total assets less furniture, equipment, automobiles, accounts receivable not taken from premiums, and investments not meeting return requirements or made in excess of permissible limits.

[12] Comparisons between Sommer (1996) and this study are impeded by differences in the two studies' premium-loss ratios. Sommer's (1996) research question enables him to use the average premium-loss ratio across all states for a given insurer and to discount losses in computing his ratios. In contrast, this study examines premium-loss ratios at the insurer-state level, where data for discounting losses is unavailable.

[13] Results are qualitatively unaltered when the numerator of PORTRISK excludes equity.

[14] Data source: NAIC, by permission. The NAIC does not endorse any analysis or conclusions based on the use of these data.

(1989) rate regulation survey. The states with no-fault insurance are identified in the Insurance Information Institute's (1993) *Fact Book.* Direct writers are identified based on a list of direct writers in 1993 (purchased in CD-ROM format from A. M. Best Co.). The population of each state in 1993 is collected from the 1997 U.S. Statistical Abstract.

The sample is limited to property and casualty insurance companies that operate in more than one state (multistate insurers). The sample is further restricted to stock insurers, the industry's principal ownership structure, to control for possible variation across organizational forms (e.g., see Mayers and Smith 1988, 1994). The data produce 19,239 insurer-state observations in 1993.

Ideally, the observable *ex post* premium-loss ratios would perfectly match the unobservable *ex ante* prices that insurers charge for a unit of coverage. Unfortunately, the *ex post* premium-loss ratios provide imperfect price measures because they suffer from resolution of uncertainty that existed when prices were set. For example, extremely large premium-loss ratios likely do not reflect long-run, sustainable income. Instead they likely overstate the profitability of some policies, such as earthquake coverage in a year without earthquakes. Consequently, to better approximate insurers' anticipated profits, we exclude observations with PLR values less than .5 or greater than 3 from our analysis.[15] This screen leaves 12,573 insurer-state observations. They include 920 insurers with the median insurer writing in nine states.

Descriptive Statistics

Table 1 presents descriptive statistics for the regression variables. Mean and median PLR is 1.61, reflecting a 61 percent markup from losses on insurance products. ETR ranges from 0.6 percent to 2.8 percent with a mean and median value of 1.5 percent, indicating that, on average, insurers remit 1.5 percent of a policy's premiums in state taxes. Ten percent of the insurer-state observations are from the seven states that levy income taxes on property-casualty insurers. Mean (median) PREMRATE is 2.4 (2.3) percent. Mean INCRATE is 0.6 percent, implying that the 1,222 observations from states with insurer income taxes face an average income tax rate of 6.4 percent.

The descriptive statistics for the control variables show 39 percent of the sample is in rate-regulated states, indicating the sample is disproportionately in the 25 states that do not regulate insurance rates. Twenty-seven percent of the sample is in the 14 states with no-fault automobile insurance. INSPOP ranges from 0.03 to 1.24, indicating wide variation in the number of insurers per state, after controlling for population. Twenty percent of the insurers are direct writers. Insurance company assets range from $1 million to $28 billion. The mean (median) insurer reports assets of $1 billion ($200 million). Statutory surplus averages one-third of total admitted assets. On average, equity, unoccupied real estate, and mortgage loans account for 14 percent of total invested assets.

Univariate Analysis

Consistent with the annual statements being managed to reduce state taxes, table 2's Pearson correlation coefficients for PLR and ETR and for PLR and INCRATE variables are negative (−0.03) and significant at the 0.05 level. The correlation between PLR and PREMRATE is not significantly different from zero.

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[15] Inferences are insensitive to restricting the sample to either positive values of PLR less than five or positive values of PLR less than ten. Similarly, inferences are unaltered if the sample is restricted to the 13,440 insurer-state observations where both premiums exceed $100,000 and losses exceed $100,000.

TABLE 1
Descriptive Statistics for the Regression Variables
12,573 Insurer-State Observations, Constructed from the 1993 State Tax and Regulatory Filings of Multistate Property-Casualty Insurers

	Mean	*Std. Dev.*	*Minimum*	*25%*	*Median*	*75%*	*Maximum*
PLR	1.61	0.59	0.50	1.18	1.56	2.01	3.00
ETR	0.015	0.005	0.006	0.012	0.015	0.018	0.028
PREMRATE	0.024	0.006	0	0.020	0.023	0.025	0.045
INCRATE	0.006	0.020	0	0	0	0	0.14
INCDUM	0.10						
RATEREG	0.39						
RESTRICT	26	15	1	13	27	41	51
NOFAULT	0.27						
INSPOP	0.29	0.27	0.03	0.11	0.19	0.31	1.24
DIRWRITE	0.20						
SIZE	19.2	1.7	13.9	17.9	19.1	20.4	24.0
CAPITAL	0.34	0.16	−0.24	0.24	0.31	0.40	1.00
PORTRISK	0.14	0.15	0	0.02	0.09	0.21	1.00

PLR is insurer i's total premiums earned less policyholder dividends divided by total losses incurred in state j; ETR is the greater of the total taxes collected from insurers in state j divided by the total premiums earned in state j or the total taxes collected from insurers in insurer i's state of domicile divided by the total premiums earned in insurer i's state of domicile; PREMRATE is the greater of the premium tax rate in state j or the premium tax rate in insurer i's state of domicile; INCRATE is the income tax rate applicable to insurers in state j; INCDUM is a categorical variable equaling one if state j levies an income tax on insurer i, otherwise zero; RATEREG is a categorical variable equaling one if state j maintains a system of prior approval regulation, state-made rates, or bureau rates, otherwise zero; RESTRICT is Conning & Company's rating of the freedom to manage personal and commercial lines in state j; NOFAULT is a categorical variable equaling one if state j has some form of no-fault automobile compensation law; DIRWRITE is a categorical variable equaling one if insurer i is a direct writer; INSPOP is the number of insurers per 1,000 people in state j; SIZE is the natural logarithm of insurer i's admitted assets; CAPITAL is insurer i's statutory surplus divided by total admitted assets; PORTRISK is the percentage of insurer i's total invested assets in equity, unoccupied real estate and mortgage loans.

The signs of the Pearson correlation coefficients between PLR and every control variable, except PORTRISK, are consistent with prior findings. Contrary to expectations, the correlation between PLR and PORTRISK is not significantly different from zero. The statistically significant correlations between the tax and control variables suggest that: (1) rate-regulated states are less likely to impose income taxes on insurers; (2) no-fault states have lower premium taxes and higher income taxes; (3) premium (income) taxes are increasing (decreasing) in the number of insurers per capita.

TABLE 2

Pearson Correlation Coefficients for the Regression Variables
12,573 Insurer-State Observations, Constructed from the 1993 State Tax and Regulatory Filings of Multistate Property-Casualty Insurers

	PLR	*ETR*	*PREMRATE*	*INCRATE*	*INCDUM*
PLR		−0.03	−0.01	−0.03	−0.03
ETR	−0.03		0.47	−0.21	−0.23
PREMRATE	−0.01	0.47		−0.21	−0.23
INCRATE	−0.03	−0.21	−0.21		0.95
INCDUM	−0.03	−0.23	−0.23	0.95	
RATEREG	−0.04	0.00	0.00	−0.05	−0.11
RESTRICT	−0.04	0.01	0.02	0.09	0.03
NOFAULT	−0.03	−0.24	−0.17	0.25	0.21
INSPOP	−0.01	0.15	0.07	−0.18	−0.20
DIRWRITE	−0.02	−0.02	−0.04	−0.02	−0.01
SIZE	−0.06	−0.02	−0.00	0.01	−0.01
CAPITAL	0.06	0.02	0.03	−0.00	0.01
PORTRISK	0.02	0.02	0.02	0.00	−0.00

Variables are defined in table 1.
Correlations ≥ 0.03 (0.04) in absolute magnitude are significant at > 0.05 (0.01).

V. PRIMARY RESULTS

ETR

The regression results in table 3 present evidence that is consistent with property-casualty insurers managing their accounting reports to mitigate tax costs.[16] The regression coefficient estimates on ETR, PREMRATE and INCRATE are always negative, as predicted, and significant with t-statistics ranging from −1.90 to −4.41.

Column A of table 3 reports the summary statistics for ETR, INCDUM and eight previously documented determinants of premium-loss ratios. Coefficient estimates are not reported for the eight lines of business. The regression coefficient on ETR is −5.33 with a t-statistic of −4.41, consistent with reported premium-loss ratios falling in state insurer taxes. The coefficient implies that a one-standard-deviation increase in the effective state tax rate (0.005) decreases the reported premium-loss ratio by 0.027 (−5.33 * 0.005). Evaluated at the mean PLR of 1.61, the finding indicates that insurers respond to a standard deviation increase in ETR by understating the premium-loss ratios they report to state regulators and tax officials by 1.7 percent (0.027/1.61).

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[16] The regression results report t-statistics using White's adjusted standard errors when the null hypothesis of correct model specification under White's (1980) test is rejected at conventional levels. Inferences are unaltered, however, if no corrections are made.

TABLE 3
Estimated Coefficients (t-statistics) from Regressions of Premium-Loss Ratios Collected from 1993 State Tax and Regulatory Filings of Property-Casualty Insurers

Model: $PLR = \beta_0 + \beta_1$ *tax measures* $+ \beta_2$ *state control variables* $+ \beta_3$ *insurer control variables* $+ \epsilon$

	Pred. Sign	*A*[a]	*B*[b]	*C*[c]	*D*[d]
Tax Variables					
ETR	(−)	−5.33		−4.07	−5.04
		(−4.41)		(−3.07)	(−3.75)
PREMRATE	(−)		−1.83		
			(−1.90)		
INCRATE	(−)		−0.94		
			(−3.57)		
Controls					
Intercept		1.93	1.87		2.17
		(22.3)	(21.5)		(168.8)
INCDUM	(?)	−0.087		−0.063	−0.085
		(−4.84)		(−3.73)	(−4.64)
RATEREG	(−)	−0.035	−0.026	−0.021	−0.034
		(−3.07)	(−2.25)	(−1.91)	(−2.87)
RESTRICT	(−)	−0.001	−0.002	−0.002	−0.001
		(−3.48)	(−3.75)	(−5.04)	(−3.45)
NOFAULT	(−)	−0.030	−0.025	−0.028	−0.029
		(−2.36)	(−1.92)	(−2.24)	(−2.27)
INSPOP	(−)	0.068	−0.072	−0.088	−0.062
		(−2.98)	(−3.23)	(−4.06)	(−2.65)
DIRWRITE	(−)	−0.033	−0.033		−0.028
		(−2.38)	(−2.39)		(−1.47)
SIZE	(−)	−0.012	−0.011		−0.020
		(−2.94)	(−2.71)		(−3.77)
CAPITAL	(+)	0.083	0.084		
		(1.99)	(2.01)		
PORTRISK	(−)	0.129	0.123		
		(3.12)	(2.98)		
Adj. R^2		0.02	0.02	0.20	0.01
n		12,573	12,573	12,573	12,573

(*Continued on next page*)

TABLE 3 (Continued)

Variables are defined in table 1.

[a] Dependent variable is total premiums written by insurer i in state j divided by total losses for insurer i in state j (PLR); explanatory variables are state j taxes divided by state j premiums (ETR) and income tax indicator variable (INCDUM) with controls for previously documented premium-loss ratio determinants (coefficients on insurer lines are not reported); sample contains multi-state insurers.

[b] Same as A, except estimated statutory premium tax rates (PREMRATE) and income tax rates (INCRATE) replace ETR.

[c] Same as A, except 920 categorical variables denoting each insurer replace insurer-specific controls.

[d] Same as A, except CAPITAL, PORTRISK and controls for the eight lines of business are excluded and t-statistics reflect Froot's (1989) adjusted standard errors.

These estimates assume implicit taxes exert no upward pressure on premiums when taxes are increased. To estimate an upper bound for implicit tax effects, assume A is the after-tax, risk-adjusted return each insurer earns in every state in which it does business (i.e., across all insurer-states). Also assume P is the pretax return for insurer-state i, and τ is the tax rate in insurer-state i. If so, $A = P_i (1 - \tau_i)$ in all insurer-states and $\partial P/\partial\tau = P/(1 - \tau)$. Evaluating $\partial P/\partial\tau$ using the mean value for PLR (1.61) to estimate P and the mean value for ETR (0.015) to estimate τ, we find a one-standard-deviation increase in ETR (0.005) increases P by 0.008 [0.005*1.61/(1 − 0.015)].

Subtracting the 0.008 estimated implicit tax-induced price increase from the −0.027 estimate of the reduction in the premium-loss ratio following a one-standard-deviation drop in ETR yields an estimated total premium-loss ratio reduction of −0.035. Dividing −0.035 by the mean premium-loss ratio suggests insurers would understate the premium-loss ratios they report to state regulators and tax officials by 2.2 percent (−0.035/1.61) if ETR was decreased by a standard deviation and maximum implicit taxes applied. In summary, including an upper-bound estimate of implicit taxes increases the estimated tax-avoidance premium-loss ratio response by 29 percent [(2.2 − 1.7)/1.7].

To estimate roughly the magnitude of state premium tax avoidance, we multiply the ETR coefficient estimate (−5.33) by the mean ETR value (0.015) and the industry's total 1993 losses of $157 billion. Assuming the ETR response relates solely to premium taxes, the resulting product of $13 billion estimates the premiums shifted to states applying a lower premium tax rate. Suppose the typical shift results in transferring premiums to a state with a one-standard-deviation-lower premium tax rate. The product of the statutory premium tax rate's standard deviation of 0.006 and $13 billion in shifted premiums yields $75 million, which approximates the state premium taxes avoided through income shifting. The tax savings average $32,000 for every U.S. insurance company or approximately 2.5 percent of property-casualty insurers' total state taxes in 1993.

Other Tax Variables

Recall INCDUM is designed to control for possible variation in premium-loss ratios between states that do and do not tax insurance companies' taxable income. No prediction for the coefficient on INCDUM is advanced. The estimated regression coefficient for INCDUM implies that insurer-states facing an income tax report 5.4 percent (−0.087/1.61) lower premium-loss ratios than insurer-states facing a premium tax. INCDUM's negative coefficient is consistent with insurer-states that face income taxes engaging in more understatement of premium-loss ratios than other insurers.

Column B of table 3 shows that the coefficients on PREMRATE (−1.83 with a t-statistic of −1.90) and INCRATE (−0.94 with a t-statistic of −3.57) are consistent with state premium tax and income tax avoidance, respectively. The results using statutory tax rates confirm the earlier findings using effective tax rates. A standard deviation increase in the PREMRATE (0.006 percentage points) reduces reported premium-loss ratios by 0.7 (2.1) percent assuming no (full) implicit taxes.[17] INCRATE's coefficient implies that a one-percentage-point increase in a state's income tax rate would decrease reported PLRs by 0.6 (1.0) percent assuming no (full) implicit taxes.[18]

Control Variables

With one exception, the signs of the other regression coefficient estimates are as predicted. The coefficients on RATEREG and RESTRICT are negative, consistent with both premium-loss ratios being suppressed and income being underreported in states with more restrictive product sales regulation. The coefficient on NOFAULT is negative, consistent with prior studies indicating lower premium-loss ratios in states with no-fault automotive insurance. INSPOP's coefficient is negative, consistent with premium-loss ratios falling in the presence of increased competition. The coefficient on DIRWRITE also is negative, confirming prior findings that insurers that directly sell their policies accept lower premium-loss ratios. The coefficient on SIZE also is negative, suggesting larger insurers accept lower premium-loss ratios. CAPITAL's coefficient is positive, consistent with less capitalized firms having to accept lower premium-loss ratios in response to buyers' concerns about their insolvency.

The sole control variable with the wrong sign is PORTRISK. Consistent with Sommer (1996), we anticipated insurers with riskier investments would be forced to lower the price of their insurance in response to buyers' concerns about their insolvency. However, consistent with the positive correlation coefficient between PLR and PORTRISK, the regression coefficient on PORTRISK is positive. The unanticipated positive coefficient may be attributable to differences in Sommer (1996) and this paper's construction of premium-loss ratios, as noted above, and/or differences in the two studies' measures of portfolio risk.[19] However, this control does not appear to affect the paper's inferences. Quantitative results are almost identical when the regression is reestimated, excluding PORTRISK from the explanatory variables.

The regression coefficient estimates for the lines of business are not presented in table 3. Consistent with Sommer's (1996) finding that premium-loss ratios are increasing in claim tails, the largest coefficient among the lines of business is on a line with particularly long tails, product and other liability. However, contrary to expectations, the coefficient on medical malpractice, another long-tailed line, is not significantly different from zero (i.e., from the coefficient on the multiple peril line). Other significantly positive coefficients are found on credit and surety and miscellaneous business lines, implying that premium-loss ratios also are larger in those business lines than in the multiple peril line. Significant negative coefficients are found on the accident and health, reinsurance and worker's compensation line-variables, suggesting that markups are smaller in these business lines than in the multiple peril line.[20]

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[17] The premium-loss ratio effect of including an upper bound for implicit taxes is $-0.021 = 0.006^*\{-1.83 - [1.61/(1-0.024)]\}$. Mean PREMRATE is 0.024.

[18] To include an upper bound for implicit taxes in determining the economic significance of the income tax avoidance, a modification of $\delta P/\delta\tau$ is required. Let the pretax return (P) equal the mark-up to losses (premiums less losses). (Data constraints limit the analysis to the primary sources of income and deductions, ignoring other income and deductions used to compute taxable income.) Mark-up is the mean value for premiums (1.61) less the mean value for losses (1.00). Evaluating the derivative with pretax returns of 0.61 and the mean tax rate facing insurers in income tax states (0.064) to estimate the tax rate, the implicit tax-induced increase in premium-loss ratios for a one-percentage-point increase in the state's income tax rate is 0.007 $[0.61/(1-.064)]^*0.01$.

[19] Sommer (1996) measures portfolio risk by estimating the investment portfolio standard deviation. He uses estimates of the insurer's asset and liability volatilities and the correlation coefficient between the asset and liability processes to quantify a risk parameter from option pricing. Sommer (1996) asserts that his measure is an improvement over the typical approaches used to assess portfolio risk, such as our method. Unfortunately, his measure would require acquisition of prohibitively expensive data from multiple years for our sample. Sommer limits his sample to 142 insurer groups and uses quarterly time-series data from 1975 to 1989. With our large sample of insurer-state observations, which includes 920 insurers, we adopt the simpler industry standard in computing PORTRISK.

Specification Checks

Columns C and D of table 3 report the results from two tests of the robustness of the results to different specifications. Conclusions are qualitatively unaltered by the results in these two regressions. Column C provides an alternative control for cross-insurer variation by replacing the insurer-specific controls (DIRWRITE, SIZE, CAPITAL, PORTRISK and lines of business) with a separate intercept for each insurer.[21] Not surprisingly, the inclusion of 920 firm indicator variables in this fixed-effects model (the sample-wide intercept is suppressed) leads to the appearance of a substantial increase in the model's explanatory power. More importantly, the coefficient on ETR remains negative (−4.07) and highly significant (t-statistic of −3.07), indicating that the results are insensitive to the specification of the insurer-specific controls.

Column D of table 3 presents summary statistics from an alternative estimation procedure undertaken to assess whether the t-statistics in the earlier regressions are overstated. Because our sample includes multiple observations for every insurer, the OLS residuals are likely contemporaneously correlated, potentially biasing the standard errors (Bernard 1987). To assess the extent of the bias, we estimate standard errors by applying the Froot (1989) technique. The Froot (1989) standard errors account for intra-insurer correlations in the residuals of each insurer and heteroskedasticity. They are consistent and asymptotically efficient.

To limit computational demands, we apply the Froot (1989) technique to the regression reported in Column A of table 3, excluding CAPITAL, PORTRISK and the eight lines of business variables.[22] The OLS coefficient estimates from this modified model are essentially identical to those reported in Column A. The Froot-adjusted standard errors are generally higher than the OLS standard errors, but the significance of the t-statistics is qualitatively unchanged. In short, any interdependencies caused by multiple observations for insurers neither overstate the statistical significance of our results nor affect the inferences drawn from OLS regressions.

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[20] To control for the possibility that purchases of lines vary across states, sensitivity tests include state lines of business. The vector of state line variables measures the percentage of each line of business aggregated at the state level as a percentage of the state's total insurance business. When the state lines of business are included as regressors with the other explanatory variables in column A, only the coefficient on the miscellaneous line is significant at the 0.05 level.

[21] No similar state fixed-effects model is tested as a robustness check for the state control variables because the correlation between state indicator variables and state tax measures might lead to conclusions that understate the actual effect of state taxes on premium-loss ratios.

[22] We were unable to secure computational capacity that would permit estimation of the entire model reported in column A using the Froot (1989) technique. Criteria for discarding control variables were (1) variables without a predicted sign (eight lines of business), (2) variables whose coefficients have the wrong sign in column A (PORTRISK) and (3) among variables whose coefficients have the predicted sign, the one with the smallest t-statistic (CAPITAL) in column A.

Robustness Tests

The findings in this study are robust to a battery of additional specification checks. First, tests were conducted to assess the sensitivity of the results to idiosyncratic events in 1993. The absence of major earthquakes and hurricanes in 1993 likely increased premium-loss ratios in some states and could reduce the study's generalizability to more catastrophic years. One possible measure of the expectation of catastrophes is the variation in premium-loss ratios across years. Accordingly, we reestimated the regression equation, dropping all 1,002 observations from the five states (Florida, Hawaii, Maine, Rhode Island and South Carolina) with the greatest variation in premium-loss ratios from 1984–1996. Inferences are qualitatively unchanged using this reduced sample of 11,571 insurer-state observations. Similarly, inferences are unaltered when we exclude observations from the eight states that suffered losses greater than $500 million from floods of the Mississippi and adjoining rivers during 1993. Together, these results provide no evidence that the findings in this paper are driven by our selection of 1993 for analysis.

Second, some states permit insurers to credit guaranty fund assessments against premium taxes. In those states, the statutory tax rate likely overstates the premium tax burden, and insurers have an incentive to overstate premiums. To assess the effect of guaranty fund assessments on the findings, the regression model was reestimated excluding insurers from six states (Arizona, Florida, Georgia, Hawaii, Louisiana and Texas) that account for 82 percent of all assessments in the U.S.[23] Inferences are qualitatively unaltered.

Third, to control for possible cross-state variation in the demand for insurance, we added the gross state product per capita (as reported in the 1997 U.S. Statistical Abstract) as a regressor. Its coefficient is not significantly different from zero, and its inclusion did not overturn any prior inferences.

Fourth, the correlation matrix in table 2 shows no relation between the tax variables and RESTRICT, a measure of a state's regulatory climate. However, it is conceivable that state tax avoidance might be curtailed in more regulated states. To assess whether tax management varies with an insurer's operational freedom, we interacted ETR with a categorical variable determined by whether the state's RESTRICT value exceeded the mean RESTRICT value. When the interaction term is included in the regression, it is not significantly different from zero and other coefficients are qualitatively unaffected.

Fifth, to determine whether the results vary between large and small insurers, we segregate the sample into the 8,860 insurer-states with greater than $500,000 in premiums and the remaining 3,713 smaller insurers. Conclusions about the effect of state taxes on premium-loss ratios do not vary between subsamples.

VI. VARIATION ACROSS LINES OF BUSINESS

The findings in the preceding section provide evidence of a negative relation between premium-loss ratios and tax rates, consistent with income shifting. However, the tests do not directly link the negative relation to management of multistate policies, leaving open the possibility that the negative relation arises for other reasons. This section reports results from additional tests designed to provide more conclusive evidence that the negative relation arises from the shifting of premiums from multistate policies. The evidence from these additional tests generally confirms cross-state tax-motivated income shifting.

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[23] 1993 guaranty fund assessments were collected from the Insurance Information Institute's (1995) *Fact Book*.

EASYETR

The first test recognizes that insurers' tax avoidance opportunities vary across lines. Automobile, farm, fire and home business lines typically involve insured property confined to a single state, precluding premium shifting. Workers' compensation is the most tightly regulated line of insurance. In fact, some states require its purchase from state workers' compensation funds. Consequently, insurers have limited opportunity to allocate workers' compensation insurance across states. Conversely, commercial peril, product liability, medical malpractice and reinsurance policies often cover property in multiple states. Thus, such product lines are more amenable to allocations that shift tax burdens across states.

To assess whether income shifting varies between these groups, a regressor is added to the original regression equation. EASYETR is ETR for the insurers writing greater than 75 percent of their business in lines other than automobile, farm, fire, home and workers' compensation, and zero for other insurers. Sixteen percent of the sample involves insurer-states with a positive value for EASYETR. Its coefficient is expected to be negative, consistent with increased tax management in business lines with more opportunities for Schedule T cross-state allocations.

As predicted, the findings in table 4, column A are consistent with tax avoidance varying between lines of business. The regression coefficient on EASYETR is −5.35 (t-statistic = −3.74), consistent with lower reported premium-loss ratios by insurers specializing in business lines where opportunities are greater to avoid taxes. Combining the ETR and EASYETR coefficients, the estimated lower-bound response (no implicit taxes) for these insurers to a one-standard-deviation increase in the effective state tax rate is a 0.049 decrease in the reported premium-loss ratio or a 3 percent drop in reported premium-loss ratios. The corresponding estimated upper-bound response (assuming full implicit tax effects) is a 0.057 (0.049 + 0.008) decrease in the reported premium-loss ratio or a 3.5 percent drop in reported premium-loss ratios.

The ETR coefficient remains negative when EASYETR is included as a regressor. This is consistent with EASYETR failing to fully capture all multistate income shifting. This also is consistent with an inherent negative relation between PLR and ETR that is unrelated to the transjurisdictional income shifting evaluated in this study. As discussed above, one possibility is that insurers underreport their premiums more in states with heavier tax burdens, regardless of whether the policy is multistate. In other words, a negative ETR coefficient is consistent with noncompliance increasing in a state's tax levy.

To investigate further the possibility of a negative relation between PLR and ETR unrelated to multistate income shifting, we reestimated (but do not report here) the original regression equation with the sample limited to the 308 insurer-years in which the insurers write only fire, home, automobile, farm and/or workers' compensation policies. Because these policies are not expected to yield substantial tax avoidance opportunities, the coefficient on ETR is not expected to be negative. Consistent with this prediction, the coefficient on ETR is positive, though not significantly greater than zero. Inferences from these results should be drawn cautiously, however, because the sample size is much smaller than in the previous regressions.

Further investigation indicates that the sign of the ETR coefficient in estimates of the original equation switches from positive to negative and becomes significant with the inclusion of firms that write any business in lines expected to involve multistate policies. This provides corroborating evidence that tax avoidance is greater in business lines covering multistate activities and further establishes that the tax avoidance documented above relates to the management of multistate policies.

TABLE 4
Estimated Coefficients (t-statistics) from Regressions of Premium-Loss Ratios Collected from 1993 State Tax and Regulatory Filings of Property-Casualty Insurers, Segregated by Lines of Business

Model: $PLR = \beta_0 + \beta_1$ *tax measures* $+ \beta_2$ *state control variable*
$+ \beta_3$ *insurer control variable* $+ \epsilon$

	A *EASYETR*[a]	B *Commercial Peril*[b]	C *Home Peril*[c]	D *Commercial Auto*[d]	E *Private Auto*[e]	F *Workers' Comp.*[f]	G *Single State*[g]
Tax Variables							
ETR	−4.46	−6.72	−1.51	−2.89	−2.27	0.71	2.47
	(−3.65)	(−2.35)	(−0.51)	(−1.09)	(−1.33)	(0.26)	(0.24)
EASYETR	−5.35						
	(−3.74)						
Controls							
Intercept	1.97	1.66	1.49	1.32	1.64	2.17	2.40
	(22.7)	(7.8)	(6.6)	(7.1)	(14.3)	(9.9)	(4.5)
INCDUM	−0.087	−0.080	−0.036	−0.088	−0.051	−0.056	0.047
	(−4.85)	(−2.01)	(−0.94)	(−2.40)	(−2.09)	(−1.51)	(0.42)
RATEREG	−0.035	0.015	0.085	−0.125	−0.003	0.004	−0.194
	(−3.09)	(0.52)	(2.99)	(−4.84)	(−0.16)	(0.16)	(−2.18)
RESTRICT	−0.001	−0.005	−0.004	0.002	−0.001	−0.003	0.003
	(−3.50)	(−4.53)	(−4.20)	(1.94)	(−1.33)	(−3.47)	(0.90)
NOFAULT	−0.030			−0.023	−0.053		0.002
	(−2.35)			(−0.78)	(−2.78)		(0.01)
INSPOP	−0.067	−0.023	−0.154	0.114	−0.069	−0.045	0.011
	(−2.96)	(−0.33)	(−2.07)	(1.56)	(1.86)	(−0.70)	(0.05)
DIRWRITE	−0.025	−0.085	−0.122	−0.058	−0.022	0.028	0.142
	(−1.84)	(−2.15)	(−3.76)	(−1.61)	(−1.26)	(0.62)	(1.39)
SIZE	−0.014	0.008	0.017	0.017	−0.001	−0.032	−0.041
	(−3.42)	(0.85)	(1.79)	(2.05)	(−0.23)	(−3.20)	(−1.40)
CAPITAL	0.089	0.256	−0.252	0.146	0.229	0.097	−0.038
	(2.12)	(1.83)	(−1.64)	(1.39)	(2.78)	(0.75)	(−0.21)
PORTRISK	0.140	−0.020	0.101	−0.086	0.127	0.082	−0.199
	(3.39)	(−0.14)	(0.96)	(−0.99)	(1.91)	(0.79)	(−0.82)
Adj. R^2	0.02	0.01	0.02	0.01	0.01	0.01	0.03
n	12,573	2,258	1,698	2,448	3,213	2,116	180

(*Continued on next page*)

TABLE 4 (Continued)

Variables are defined in table 1.

[a] Dependent variable is total premiums written by insurer i in state j divided by total losses for insurer i in state j (PLR); explanatory variables are state j taxes divided by state j premiums (ETR), income tax indicator variable (INCDUM), segregated by EASYETR (i.e., ETR if insurer i writes more than 75 percent of its business in lines other than automobile, farm, fire, home, or workers' compensation; otherwise zero) with controls for previously documented premium-loss ratio determinants (coefficients on insurer lines are not reported); sample contains multistate insurers.

[b] Dependent variable is commercial peril premiums written by insurer i in state j divided by commercial peril losses for insurer i in state j; explanatory variables are state j taxes divided by state j premiums (ETR) and income tax indicator variable (INCDUM) with controls for previously documented premium-loss ratio determinants; sample contains insurer-state observations with commercial multiple peril premiums > $500,000.

[c] Same as B, except sample contains insurer-state observations with homeowners premiums > $500,000.

[d] Same as B, except sample contains insurer-state observations with commercial automobile premiums > $500,000.

[e] Same as B, except sample contains insurer-state observations with passenger automobile premiums > $500,000.

[f] Same as B, except sample contains insurer-state observations with workers' compensation premiums > $500,000.

[g] Same as A, except EASYETR is excluded and sample contains single-state insurers.

Specific Lines of Business

The next set of tests examines the relation between tax rates and the premium-loss ratios within different lines of business. These tests segregate PLR by lines of business for each insurer-state.[24] If management of multistate tax policies is the mechanism through which property-casualty insurers reduce overall state taxes, then the tax coefficients in the lines of business where multistate policies are most prevalent should be more negative than the tax coefficients in other lines.

Although a line-of-business research design potentially strengthens the study's internal validity, it also introduces additional measurement error for both PLR and ETR. Previously, PLR has been measured using all premiums and losses for an individual insurer in a given state. Variables for specific lines of business have been used to control for variation in premium-loss ratio arising from different product mixes by individual insurers. The advantage of the prior premium-loss ratio measure is that it captures insurers' reliance on a portfolio of risks when pricing their coverage. For example, suppose a carrier insures both flood and drought. Its pricing reflects the probability that flood and drought will occur simultaneously. The prior premium-loss ratio measure incorporated such cross-subsidized lines, recognizing that income from one line is designed to offset losses from another line. Separately evaluating the premium-loss ratios for cross-subsidized lines could misstate the insurer's actual profitability and potentially lead to false inferences about the effect of taxes on premium-loss ratios.

Taxes also face measurement error in the lines-of-business regressions. Recall that ETR is the average tax rate faced by property-casualty insurers. Premium tax rates in some states vary across different lines of business. To our knowledge, effective tax rates by line of business are not available. To the extent cross-line taxes vary, the lines-of-business regressions may misstate income shifting.

To mitigate the premium-loss ratio and tax measurement concerns, we restrict the line-of-business analyses to major lines. NAIC data are available for 38 lines of business. Combining several lines, we analyze five major categories of insurance business: commercial multiple peril, homeowners multiple peril, commercial automobile, private passenger automobile and workers' compensation.[25] Among the five major lines, we further restrict the sample to insurer-states with at least $500,000 of premiums in that line.[26]

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[24] Ideally, explanatory variables also should be segregated by lines of business, e.g., state rate regulation may apply to some lines and not others. Unfortunately, data limitations prevent segregation of the explanatory variables by lines of business. Thus, the regressors remain unchanged in these tests, except that no line-of-business controls are necessary.

Our expectation is that commercial coverage involves more multistate policies than individual coverage. Thus, a more negative ETR coefficient is anticipated for commercial multiple peril than for homeowners and for commercial automobile than for private passenger automobile. Also consistent with our prior reasoning, we expect that regulatory restrictions limit insurers' ability to shift workers' compensation premiums.

Table 4, columns B–F present the results from the line-of-business regressions. Columns B and C report results where the dependent variables are the multiple peril insurance premium-loss ratios for commercial and homeowners, respectively. Consistent with investors avoiding taxes by shifting premiums from multistate policies, the ETR coefficient when the dependent variable is commercial insurance is significantly less than zero and more negative than when the dependent variable is homeowners' insurance. In the commercial peril regression (column B), the ETR coefficient is −6.72 with a t-statistic of −2.35. In the homeowners peril regression (column C), the ETR coefficient is −1.51 with a t-statistic of −0.51.

Columns D and E of table 4 report results where the dependent variables are the automobile insurance premium-loss ratios for commercial and private passenger, respectively. Unlike the multiple peril findings, the ETR coefficients for commercial and private passenger coverage are not significantly different. Although both coefficients are negative, neither is significantly different from zero. Thus, the automobile insurance findings present no evidence of any tax avoidance, no matter the extent of multistate policies. One possible alternative explanation for the lack of income shifting is that automobile insurance, even for commercial buyers, is more regulated than multiple peril. Thus, businesses may be less able to shift automobile insurance premiums across states than multiple peril insurance premiums.

Consistent with expectations, column F of table 4 presents no evidence of insurers shifting premiums from workers' compensation, the most highly regulated form of insurance. The ETR coefficient is positive and not significantly different from zero. The failure to detect tax avoidance with workers' compensation premiums is consistent with tax avoidance being concentrated among lines of business where opportunities for premium shifting are most prevalent.

In summary, the results from the lines of business regressions are mixed. The multiple peril insurance and the workers' compensation insurance findings are consistent with multistate policies providing the mechanism through which property-casualty insurers avoid state taxes. However, no such evidence is detected in the automobile insurance findings.

Single-State Insurers

The final attempt to ascertain whether insurers are allocating premiums from multistate policies involves insurers that write policies in only one state. We interpret the negative ETR coefficients observed in a sample of multistate insurers as evidence of tax-motivated cross-state allocations of premiums in the statutory reports filed with state officials. This interpretation would be suspect if we found a negative ETR coefficient when the sample is restricted to insurers that file in only one state. Forced to report all premiums in a single state, these insurers cannot avail themselves of a tax management strategy that requires multistate filings. We cannot develop a meaningful prediction of what the ETR coefficient will be in the single-state sample. However, a nonnegative coefficient in the single-state sample would add credibility to our current interpretation that the negative ETR coefficient in the multistate sample is indicative of tax-motivated premium shifting across states.

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[25] These five lines dominate the property-casualty business. For example, in 1993 the five lines covered 79 percent of all property-casualty insurance written in California.

[26] Applying a $500,000 premiums threshold reduces the sample by 54 percent for commercial automobile and by 34 percent for private passenger automobile. Inferences are unchanged if the threshold is lowered to $250,000. If no thresholds are applied, conclusions hold, except homeowners, where the ETR coefficient becomes more negative and significant (−7.74 with a t-statistic of −3.31).

Table 4, column G reports the results from estimating the regression equation using the 180 insurers that only underwrite in their state of incorporation and are unaffiliated with any insurers in other states. The ETR coefficient is not significantly different from zero. The failure to find a negative coefficient on ETR within the sample of single-state insurers provides further evidence that multistate insurers are reducing taxes through manipulation of Schedule T. The absence of a negative ETR coefficient implies multistate insurers enjoy a competitive advantage, compared with single-state insurers, because they can exploit a tax reduction strategy unavailable to single-state insurers.

The results from the single-state regression should be interpreted cautiously. The single-state regression is limited to only 180 observations, which may provide insufficient power to detect a relation between PLR and ETR. Furthermore, unlike the multistate estimates, none of the coefficients on the explanatory variables, except RATEREG, is significantly different from zero. The poor specification is consistent with both inadequate power from the smaller single-state insurer sample and unspecified differences in the premium-loss ratio determinants of multistate and single-state insurers.

VII. CONCLUSION

This paper extends our understanding of tax-motivated income shifting by exploiting the unique state taxes and disclosures in the property-casualty insurance industry. It attributes an association between insurers' premium-loss ratios and state taxes to the tax-managed allocation of premiums by multistate insurers. Consistent with income shifting to avoid state taxes, we find premium-loss ratios are decreasing in state tax rates. The results are consistent with multistate insurers managing their annual accounting reports to shift premiums to more favorably taxed states.

Using the regression coefficients, we estimate that insurers would respond to a standard deviation increase in state effective tax rates by understating the premium-loss ratios they report to state regulators and tax officials by 1.7 to 2.2 percent. The overstatement increases to 3.0 to 3.5 percent for insurers specializing in multistate lines of business. We estimate that the aggregate tax savings in 1993 were roughly 2.5 percent of the total annual state taxes paid by the property-casualty insurers.

This paper is the first, to our knowledge, to consider jointly the negative price-tax relation induced by tax-motivated income shifting and the positive price-tax relation induced by the consideration of implicit taxes. Prior income-shifting studies have ignored implicit taxes, potentially understating tax manipulation.

REFERENCES

Beatty, A., S. Chamberlain, and J. Magliolo. 1995. Managing financial reports of commercial banks: The influence of taxes, regulatory capital, and earnings. *Journal of Accounting Research* 33: 231–261.

Bernard, V. 1987. Cross-sectional dependence and problems in inference in market-based accounting research. *Journal of Accounting Research* 25: 1–48.

Browne, M., and R. Hoyt. 1995. Economic and market predictors of insolvencies in the property-liability insurance industry. *Journal of Risk and Insurance* 62: 309–327.

Collins, J., G. Geisler, and D. Shackelford. 1997. The effects of taxes, regulation, earnings, and organizational form on life insurers' investment portfolio realizations. *Journal of Accounting and Economics* 24: 337–361.

———, D. Kemsley, and M. Lang. 1997. Cross-jurisdictional income shifting and earnings valuation. *Journal of Accounting Research* 36: 209–229.

———, ———, and D. Shackelford. 1997. Transfer pricing and the persistent zero taxable income of foreign-controlled U.S. corporations. *The Journal of the American Taxation Association* 19 (Supplement): 68–83.

———, and D. Shackelford. 1997. Global organizations and taxes: An analysis of the dividend, interest, royalty, and management fee payments between U.S. multinationals' foreign affiliates. *Journal of Accounting and Economics* 24: 151–173.

———, D. Shackelford, and J. Wahlen. 1995. Bank differences in the coordination of regulatory capital, earnings, and taxes. *Journal of Accounting Research* 33: 263–291.

Cummins, J., S. Harrington, and B. Smith. 1980. An analysis of the impact of alternative rate regulatory systems on underwriting profitability in property-liability insurance. Presentation at the 1980 meeting of the American Risk and Insurance Association, Chicago, IL.

———, and J. VanDerhei. 1979. A note on the relative efficiency of property-liability insurance distribution systems. *Bell Journal of Economics* 10: 709–719.

Erickson, M., and E. Maydew. 1998. Implicit taxes in high dividend yield stocks. *The Accounting Review* 73: 435–458.

Froot, K. 1989. Consistent covariance matrix estimation with cross-sectional dependence and heteroskedasticity in financial data. *Journal of Financial and Quantitative Analysis* 24 (3): 333–355.

Grubert, H., T. Goodspeed, and D. Swenson. 1993. Explaining the low taxable income of foreign-controlled companies in the U.S. In *Studies in International Taxation*, edited by A. Giovanni, R. Hubbard, and J. Slemrod, 237–275. Chicago, IL: University of Chicago Press.

Harrington, S. 1984. The impact of rate regulation on prices and underwriting results in the property-liability insurance industry: A survey. *Journal of Risk and Insurance* 51: 577–623.

Harris, D. 1993. The impact of U.S. tax law revision on multinational corporations' capital location and income-shifting decisions. *Journal of Accounting Research* 31 (Supplement): 111–140.

———, R. Morck, J. Slemrod, and B. Yeung. 1993. Income shifting in U.S. multinational corporations. In *Studies in International Taxation*, edited by A. Giovanni, R. Hubbard, and J. Slemrod, 277–307. Chicago, IL: University of Chicago Press.

Insurance Information Institute. 1993. *The Fact Book Property/Casualty Insurance Facts*. New York, NY: Insurance Information Institute.

———. 1995. *The Fact Book Property/Casualty Insurance Facts*. New York, NY: Insurance Information Institute.

Jacob, J. 1996. Taxes and transfer-pricing: Income shifting and the volume of intra-firm transfers. *Journal of Accounting Research* 34: 301–312.

Joskow, P. 1973. Cartels, competition, and regulation in the property-liability insurance industry. *Bell Journal of Economics and Management Science* 4: 375–427.

Klassen, K., M. Lang, and M. Wolfson. 1993. Geographic income shifting by multinational corporations in response to tax rate changes. *Journal of Accounting Research* 31 (Supplement): 141–173.

———, and D. Shackelford. 1998. State and provincial corporate tax planning: Income shifting and sales apportionment factor management. *Journal of Accounting and Economics* 25 (3): 385–406.

Mayers, D., and C. Smith. 1988. Ownership structure across lines of property-casualty insurance. *Journal of Law and Economics* 31: 351–378.

———. 1994. Managerial discretion, regulation, and stock insurer ownership structure. *Journal of Risk and Insurance* 61: 638–655.

National Association of Insurance Commissioners (NAIC). 1989. Rate regulation by state. Mimeo available from the NAIC library.

———. 1992. *Retaliation: A Guide to Retaliatory Taxes, Fees, Deposits, and Other Requirements.* Kansas City, MO: NAIC.

———. 1994. *1993 Insurance Department Resources Report.* Kansas City, MO: NAIC.

Petroni, K., and D. Shackelford. 1995. Taxation, regulation, and the organizational structure of property-casualty insurers. *Journal of Accounting and Economics* 20: 229–253.

Scholes, M., G. Wilson, and M. Wolfson. 1990. Tax planning, regulatory capital planning, and financial reporting strategy for commercial banks. *Review of Financial Studies* 3: 625–650.

———, and M. Wolfson. 1992. *Taxes and Business Strategy: A Planning Approach.* Englewood Cliffs, NJ: Prentice Hall.

Sommer, D. 1996. The impact of firm risk on property-liability insurance prices. *Journal of Risk and Insurance* 63: 501–514.

U.S. Bureau of the Census. 1997. *Statistical Abstract of the United States: 1997.* 117th edition. Washington D.C.

Vines, C. 1996. Tax shifting in a regulated industry: An analysis of the property and casualty insurance industry. *The Journal of the American Taxation Association* 18: 48–71.

White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48: 817–838.

Witt, R., and H. Miller. 1981. Price competition, regulation, and systematic underwriting risk in auto insurance markets. *CPCU Journal* 34: 174–189.

———, and J. Urrutia. 1983. A comparative economic analysis of tort liability and no-fault compensation systems in automobile insurance. *Journal of Risk and Insurance* 50: 631–669.

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BOOK REVIEWS

Thomas H. Williams, Editor

Editor's Note: Two copies of books for review should be sent to Professor Thomas H. Williams, McIntire School of Commerce, University of Virginia, Charlottesville, VA 22903-2493. The policy of *The Accounting Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.

MARGARET LEVENSTEIN, *Accounting for Growth: Information Systems and the Creation of the Large Corporation* (Stanford, CA: Stanford University Press, 1998, xiv, 277, $49.50 Hb).

This book is a case study of a medium-sized midwestern chemical company between 1890 and 1914. It traces the events of the Dow Chemical Company during the period and describes the demands for new information placed upon the management who were faced with growing firm size, increasing complexity of the firm and changing market structures. It also delineates the changes the management made in its information system to cope with and to gain competitive advantage in a rapidly changing economy.

Prior to the turn of the century technological and economical environments were stable. Management needed only limited amounts of information to make but few relatively simple sets of decisions. Being a small, vertically distinct manufacturing firm, Dow Chemical Company in the late nineteenth century needed few formal measures of its internal firm activity in monitoring its operations to satisfy the needs of its owner/management. Information needs for the small organization were satisfied through informal and virtually costless direct observations. Notes made by Mr. Dow in his personal notepad provided all the information needed.

With growing firm size, increasing separation of ownership from management and broadening vertical integration, direct observation of operations to obtain all the information needed to monitor operations and make increasingly complex decisions became both difficult and costly. Worse, the limited information available restricted the firm from taking full advantage of the new markets and the new technological possibilities. Innovations in information processing technology during this time, from typewriter to vertical filing systems, allowed Dow Chemical Company to adopt technologies and organizations that depended on the production and transmission of large quantities of formal information. The new information system, in turn, allowed the firm to adapt to and take advantage of new markets and new technologies.

Among the most important shifts in demand for information from 1890 to 1914 in Dow Chemical Company were those associated with changes in the firm's strategy. In its early years the information needs were limited when the firm was small, manufactured only a single product, and marketed its entire output through distributors who conspired to control competition in all markets.

As Dow Chemical Company pursued a technologically innovative, multi-product strategy and eliminated many of its older competitors as well as their collusive distribution organizations, the firm was catapulted into a large, vertically integrated firm. A result of this strategic shift was the change in the types, quantities and uses of information. There was an increase in the quantity of formal information produced and a dramatic change in the focus of information collection. The focus shifted from one of measuring cash flow and monitoring individual managers to assure their accountability to one of measuring the cost, quality and profitability of individual products.

Changes in the information system led to shifts in managerial attention and, in the long run, to shifts in firm strategy. The changes in the information system reinforced the elements of the firm's strategy that emphasized mass production and developments of new products. Information system changes also pushed the firm toward more vertical integration and led the firm to eliminate key products, such as bleach, from its business.

This book contains seven chapters. After the introduction in chapter one, which succinctly summarizes the main thrusts of the book, chapter two reviews the history of early manufacturing accounting, and chapter three presents a history of Dow Chemical Company during the period of interest. These two historical chapters serve as the basis for discussion for the remaining four chapters. Throughout the book, the author attempts to demonstrate that the following changes led to modification of the information system: (1) evolution of the firm over its own life cycle, (2) adoption of new organizational forms and (3) changes in market structure.

The book should prove to be interesting for students of accounting history. Readers will find the author's description of the rapid changes over the years of Dow Chemical Company, and the chemical industry in general, to be interesting and instructive.

KUNG H. CHEN
Professor

University of Nebraska

RICHARD MORRIS, *Early Warning Indicators of Corporate Failure: A Critical Review of Previous Research and Further Empirical Evidence* (Brookfield, VT: Ashgate Publishing Company, 1997, xii, 425, $93.95 Hb).

This book provides a comprehensive survey of bankruptcy research, specifically dealing with the identification of financially distressed firms. The author's clear and organized synthesis of this extensive literature discusses the theory of corporate failure and the various methodologies applied to such investigations, as well the variables found in prior studies. In addition to simply summarizing the results reported in prior research, the author applies the statistical methods found in this literature to sample data drawn from a population of bankrupt-listed companies in the United Kingdom (U.K.). This empirical analysis facilitates the comparison and evaluation of the various statistical methods and models, a contribution not attempted in prior bankruptcy research literature reviews.

The author begins with a limited discussion of the numerous possible meanings of "corporate failure" and "prediction." Implicit in his arguments is the importance of evaluating the choice of distress indicator or prediction meaning (e.g., identification or forecast) on research design and variable selection. The next six chapters are devoted to a review of both normative and positive theories of corporate failure. The book specifically considers financial distress using disequilibrium, financial and agency models, as well as valuation and management theory. This discussion is followed by a thorough review of univariate, multivariate and iterative modeling in a corporate failure context. The author also describes the use of early warning studies, laboratory experiments and case research in investigating the identification of distressed firms. The literature review concludes with two chapters devoted to the financial and nonfinancial indicators frequently included as independent variables in corporate failure studies.

The remainder of the book illustrates the application of commonly used research methods to three matched-pair data sets of failed and nonfailed U.K. companies generally covering the period 1973 to 1983. The book's empirical examination of British firms appears to reinforce previous research suggesting that neither "sophisticated" statistical techniques nor improved model specification contribute significantly to improving discriminatory power or classification accuracy in distress prediction studies. The author willingly accepts these results as "an inevitable consequence of having to pool data over time for companies in different industries." This conclusion may be premature since the book does not examine the early warning systems developed by bank and savings and loan researchers during the 1980s. This decade witnessed a banking crisis in the United States in which regulators closed hundreds of institutions and failure rates exceeded those of the Great Depression. Several thrift industry studies during this period suggest that prediction model stability and consistency can be affected by (1) changing structural conditions within an industry and (2) the definition of financial distress.

The monograph's contribution to the literature could have been enhanced had the author recommended future research avenues to promote the development of better performing distress prediction models. For example, the author acknowledges the usefulness of factor analysis in variable selection, but does not address the potential benefits of structural equation modeling using latent or unobserved variables. In fact, several banking papers suggest that distress prediction should be modeled as a two-step process. In the first step, latent variables for the various types of risk a firm might assume are represented as functions of commonly used accounting ratios. In the next stage, financial distress is modeled as a function of the latent risk variables identified in step one. Such an approach offers the advantages of improved specification and a possible reduction in measurement error.

Regardless of the reservations expressed above, this book serves as an excellent primer for those interested in financial distress prediction techniques. It is logically organized and written in a style that is appropriate for a wide audience that includes both practitioners and academics. Moreover, its organization permits the reader to focus on topics of individual interest without any loss of content.

ANTHONY H. CATANACH, JR.
Assistant Professor

Villanova University

BOOKS RECEIVED JANUARY 15, 1999 TO APRIL 15, 1999

VIVIEN BEATTIE, ed., *Business Reporting: The Inevitable Change?* (Edinburgh, Scotland: The Institute of Chartered Accountants of Scotland, 1999, xiv, 113, Pb £15.00).

E. JAMES BURTON, *Total Business Planning: A Step-by-Step Guide with Forms*, 3rd edition, (New York, NY: John Wiley & Sons, Inc., 1999, viii, 243, Pb $29.95).

D. R. CARMICHAEL, STEVEN B. LILIEN, and MARTIN MELLMAN, *Accountants' Handbook, 2 volumes,* 9th edition (New York, NY: John Wiley & Sons, Inc., 1999, Pb $125).

GARY L. COOPER, and CHRIS ARGYRIS, *The Concise Blackwell Encyclopedia of Management* (Malden, MA: Blackwell Publishers Inc., 1998, xviii, 701, Pb $39.95).

TIMOTHY S. DOUPNIK, ed., *Advances in International Accounting (Supplement 1, 1998)* (Stamford, CT: JAI Press Inc., 1998, x, 251, Hb $78.50).

ERNST & YOUNG, *Ernst & Young's Financial Planning for Women: A Woman's Guide to Money for All of Life's Major Events* (New York, NY: John Wiley & Sons, Inc., 1999, x, 241, Pb $16.95).

CLAIRE MARSTON, *Investor Relations Meetings: Views of Companies, Institutional Investors and Analysts* (Edinburgh, Scotland: The Institute of Chartered Accountants of Scotland, 1999, xi, 125, Pb £15.00).

PHILIP M. J. RECKERS, ed., *Advances in Accounting (Vol. 16)* (Stamford, CT: JAI Press Inc., 1998, xiv, 267, Hb $78.50).

AHMED RIAHI-BELKAOUI, *Capital Structure: Determination, Evaluation, and Accounting* (Westport, CT: Quorum Books, 1999, xiii, 210, Hb $65).

WARREN RUPPEL, *GAAP for Governments 1999: Interpretation and Application of Generally Accepted Accounting Principles for State and Local Governments* (New York, NY: John Wiley & Sons, Inc., 1999, viii, 568, Pb $65).

DONNIEL S. SCHULMAN, MARTIN J. HARMER, JOHN R. DUNLEAVY, and JAMES S. LUSK, *Shared Services: Adding Value to the Business Units* (New York, NY: John Wiley & Sons, Inc., 1999, xxv, 294, Hb $59.95).

REED TINSLEY, and JOE D. HAVENS, *Performing an Operational and Strategic Assessment for a Medical Practice* (New York, NY: John Wiley & Sons, Inc., 1999, xvi, 256, Hb $89).

PRISCILLA TRUMBULL, and FRANTZ R. PRICE, eds., *WEFA Industrial Monitor 1999–2000* (New York, NY: John Wiley & Sons, Inc., 1999, Hb $59.95).

REXFORD E. UMBENHAUR III, *Selling Your Business Successfully: Tips, Strategies, and Tools* (New York, NY: John Wiley & Sons, Inc., 1999, xviii, 326, Pb $24.95).

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT, *Bilateral Investment Treaties in the Mid-1990s* (Geneva, Switzerland: United Nations, 1998, xii, 305, Pb).

PAULINE WEETMAN and AILEEN BEATTIE, eds., *Corporate Communications: Views of Institutional Investors and Lenders* (Edinburgh, Scotland: The Institute of Chartered Accountants of Scotland, 1999, x, 119, Pb £15.00).

Editorial Data

Manuscripts submitted to *The Accounting Review* are assigned two reviewers. The following table contains information about turnaround time for reviewed manuscripts for the twelve-month period ended February 28, 1999. Turnaround time is the number of days between the date of the editor's letter to the author(s) and the date that the manuscript and submission fee were received:

	Number of Manuscripts	Cumulative Number	Cumulative Percent
0 ≤ Days ≤ 30	10	10	4.6
31 ≤ Days ≤ 60	32	42	19
61 ≤ Days ≤ 90	147	189	87.5
91 ≤ Days ≤ 120	27	216	100

The mean review time was 71 days; the median review time was 74 days. A limited number of manuscripts are returned without review and such manuscripts are excluded from the turnaround time statistics reported above.

EDITORIAL POLICY AND STYLE INFORMATION

EDITORIAL POLICY

According to the policies set by the Publications Committee (which were endorsed by the Executive Committee and were published in the *Accounting Education News*, June 1987), *The Accounting Review* "should be viewed as the premier journal for publishing articles reporting the results of accounting research and explaining and illustrating related research methodology. The scope of acceptable articles should embrace any research methodology and any accounting-related subject, as long as the articles meet the standards established for publication in the journal....No special sections should be necessary. The primary, but not exclusive, audience should be—as it is now—academicians, graduate students, and others interested in accounting research."

The primary criterion for publication in *The Accounting Review* is the significance of the contribution an article makes to the literature.

The efficiency and effectiveness of the editorial review process is critically dependent upon the actions of both authors submitting papers and the reviewers. Authors accept the responsibility of preparing research papers at a level suitable for evaluation by independent reviewers. Such preparation, therefore, should include subjecting the manuscript to critique by colleagues and others and revising it accordingly prior to submission. The review process is not to be used as a means of obtaining feedback at early stages of developing the research.

Reviewers and associate editors are responsible for providing critically constructive and prompt evaluations of submitted research papers based on the significance of their contribution and on the rigor of analysis and presentation. Associate editors also make editorial recommendations to the editor.

MANUSCRIPT PREPARATION AND STYLE

The Accounting Review's manuscript preparation guidelines follow (with a sight modification) the B-format of *The Chicago Manual of Style* (14th ed.; University of Chicago Press). Another helpful guide to usage and style is *The Elements of Style*, by William Strunk, Jr., and E. B. White (Macmillan). Spelling follows *Webster's International Dictionary.*

FORMAT

1. All manuscripts should be typed on one side of 8½ × 11" good quality paper and be double spaced, except for indented quotations.
2. Manuscripts should be as concise as the subject and research method permit, generally not to exceed 7,000 words.
3. Margins of at least one inch from top, bottom and sides should facilitate editing and duplication.
4. To assure anonymous review, authors should not identify themselves directly or indirectly in their papers. Single authors should not use the editorial "we."
5. A cover page should show the title of the paper, the author's name, title and affiliation, any acknowledgments, and a footnote indicating whether the author would be willing to share the data (see last paragraph in this statement).

Pagination: All pages, including tables, appendices and references, should be serially numbered. The first section of the paper should be untitled and unnumbered. Major sections may be numbered in Roman numerals. Subsections should not be numbered.

Numbers: Spell out numbers from one to ten, except when used in tables and lists, and when used with mathematical, statistical, scientific, or technical units and quantities, such as distances, weights and measures. For example: *three days; 3 kilometers; 30 years.* All other numbers are expressed numerically.

Percentages and Decimal Fractions: In nontechnical copy use the word percent in the text.

Hyphens: Use a hyphen to join unit modifiers or to clarify usage. For example: *a well-presented analysis; re-form.* See *Webster's* for correct usage.

Key Words: The abstract is to be followed by four key words that will assist in indexing the paper.

ABSTRACT/INTRODUCTION

An Abstract of about 100 words should be presented on a separate page immediately preceding the text. The Abstract should concisely inform the reader of the manuscript's topic, its methods and its findings. Key Words and the Data Availability statements should follow the Abstract. The text of the paper should start with a section labeled "I. Introduction," which provides more details about the paper's purpose, motivation, methodology and findings. Both the Abstract and the introduction should be relatively nontechnical, yet clear enough for an informed reader to understand the manuscript's contribution. The manuscript's title, but neither the author's name nor other identification designations, should appear on the Abstract page.

TABLES AND FIGURES

The author should note the following general requirements:

1. Each table and figure (graphic) should appear on a separate page and should be placed at the end of the text. Each should bear an Arabic number and a complete title indicating the exact contents of the table or figure.
2. A reference to each graphic should be made in the text.
3. The author should indicate by marginal notation where each graphic should be inserted in the text.
4. Graphics should be reasonably interpreted without reference to the text.
5. Source lines and notes should be included as necessary.

Equations: Equations should be numbered in parentheses flush with the right-hand margin.

DOCUMENTATION

Citations: Work cited should use the "author-date system" keyed to a list of works in the reference list (see below). Authors should make an effort to include the relevant page numbers in the cited works.

1. In the text, works are cited as follows: authors' last name and date, without comma, in parentheses: for example, (Jones 1987); with two authors: (Jones and Freeman 1973); with more than two: (Jones et al. 1985); with more than one source cited together (Jones 1987; Freeman 1986); with two or more works by one author: (Jones 1985, 1987).
2. Unless confusion would result, do not use "p." or "pp." before page numbers: for example, (Jones 1987, 115).
3. When the reference list contains more than one work of an author published in the same year, the suffix a, b, etc. follows the date in the text citation: for example, (Jones 1987a) or (Jones 1987a; Freeman 1985b).
4. If an author's name is mentioned in the text, it need not be repeated in the citation; for example, "Jones (1987, 115) says...."
5. Citations to institutional works should use acronyms or short titles where practicable; for example, (AAA ASOBAT 1966); (AICPA Cohen Commission Report 1977). Where brief, the full title of an institutional work might be shown in a citation: for example, (ICAEW *The Corporate Report* 1975).
6. If the manuscript refers to statutes, legal treatises or court cases, citations acceptable in law reviews should be used.

Reference List: Every manuscript must include a list of references containing only those works cited. Each entry should contain all data necessary for unambiguous identification. With the author-date system, use the following format recommended by *The Chicago Manual*:

1. Arrange citations in alphabetical order according to surname of the first author or the name of the institution responsible for the citation.
2. Use author's initials instead of proper names.
3. Date of publication should be placed immediately after author's name.
4. Titles of journals should not be abbreviated.
5. Multiple works by the same author(s) in the same year are distinguished by letters after the date.
6. Inclusive page numbers are treated as recommended in *Chicago Manual* section 8.67.

Sample entries are as follows:

American Accounting Association, Committee on Concepts and Standards for External Financial Reports. 1977. *Statement on Accounting Theory and Theory Acceptance*. Sarasota, FL: AAA.

Demski, J. S., and D. E. M. Sappington. 1989. Hierarchical structure and responsibility accounting. *Journal of Accounting Research* 27 (Spring): 40–58.

Dye, R., B. Balachandran, and R. Magee. 1989. Contingent fees for audit firms. Working paper, Northwestern University, Evanston, IL.

Fabozzi, F., and I. Pollack, eds. 1987. *The Handbook of Fixed Income Securities*. 2nd edition. Homewood, IL: Dow Jones-Irwin.

Kahneman, D., P. Slovic, and A. Tversky, eds. 1982. *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge, U.K.: Cambridge University Press.

Porcano, T. M. 1984a. Distributive justice and tax policy. *The Accounting Review* 59 (October): 619–636.

———. 1984b. The perceived effects of tax policy on corporate investment intentions. *The Journal of the American Taxation Association* 6 (Fall): 7–19.

Shaw, W. H. 1985. Empirical evidence on the market impact of the safe harbor leasing law. Ph.D. dissertation, University of Texas at Austin.

Sherman, T. M., ed. 1984. *Conceptual Framework for Financial Accounting*. Cambridge, MA: Harvard Business School.

Footnotes: Footnotes are not used for documentation. Textual footnotes should be used only for extensions and useful excursions of information that if included in the body of the text might disrupt its continuity. Footnotes should be consecutively numbered throughout the manuscript with superscript Arabic numerals. Footnote text should be doubled-spaced and placed at the end of the article.

SUBMISSION OF MANUSCRIPTS

Authors should note the following guidelines for submitting manuscripts:

1. Manuscripts currently under consideration by another journal or publisher should not be submitted. The author must state that the work is not submitted or published elsewhere.
2. In the case of manuscripts reporting on field surveys or experiments, four copies of the instrument (questionnaire, case, interview plan or the like) should be submitted.
3. Four copies should be submitted together with a check in U.S. funds for $75.00 for members or $100.00 for nonmembers of the AAA made payable to the American Accounting Association. Effective January 1990, the submission fee is nonrefundable.
4. The author should retain a copy of the paper.
5. Revisions must be submitted within 12 months from request, otherwise they will be considered new submissions.

COMMENTS

Comments on articles previously published in *The Accounting Review* will be reviewed (anonymously) by two reviewers in sequence. The first reviewer will be the author of the original article being subjected to critique. If substance permits, a suitably revised comment will be sent to a second reviewer to determine its publishability in *The Accounting Review*. If a comment is accepted for publication, the original author will be invited to reply. All other editorial requirements, as enumerated above, also apply to proposed comments.

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The following policy has been adopted by the Executive Committee in its April 1989 meeting.

"An objective of (*The Accounting Review, Accounting Horizons, Issues in Accounting Education*) is to provide the widest possible dissemination of knowledge based on systematic scholarly inquiries into accounting as a field of professional research, and educational activity. As part of this process, authors are encouraged to make their data available for use by others in extending or replicating results reported in their articles. Authors of articles which report data dependent results should footnote the status of data availability and, when pertinent, this should be accompanied by information on how the data may be obtained."

JULY 1999 PLACEMENT ADS

*The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication. The **Review** is published on the first day of January, April, July and October. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 34233-2399, ATTENTION: ADVERTISING DEPT. All replies to box numbers should be on separate sheets to facilitate forwarding.*

301 UNIVERSITY OF TEXAS AT EL PASO invites applications for the position of Assistant/Associate Professor of Accounting with specialization in Accounting Information Systems. AACSB-accredited College of Business and Accounting Department. Candidates must have a Ph.D. or D.B.A. with a major in Accounting prior to appointment. The successful applicant will teach graduate and undergraduate accounting courses, perform research and publish, and perform academic and professional service. Applicants for Associate Professor must have a record of accomplishment in these areas. Professional certification (e.g., CPA, CIA or CMA) also desirable. Position contingent on availability of funding. Application deadline is September 30, 1999 or until position is filled. Send letter of application, resume and names of three references to Dr. Gary J. Mann, Chair, UTEP, Department of Accounting, College of Business Administration, El Paso, TX 79968-0542 (http://www.utep.edu). The University does not discriminate on the basis of race, color, national origin, sex, religion, age or disability in employment or the provision of services.

302 UNIVERSITY OF RICHMOND is seeking a Visiting Professor for the Spring semester of the 1999–2000 academic year. Applicant would teach International Accounting and Managerial Accounting at either the Introductory or M.B.A. level. Applicants with experience developing a 150-hour program and revising the introductory accounting courses are particularly encouraged to apply as are applicants from outside the U.S. The University of Richmond is a well-endowed private university with approximately 3,000 students. The University's primary focus is high-quality undergraduate education. The University is located in a beautiful setting on a wooded lake on the outskirts of Richmond, Virginia. More information is available on the web at http://www.richmond.edu. Applicants should send a letter of application to Professor Bob Sanborn, Robins School of Business, University of Richmond, Richmond, VA 23173. Email applications are encouraged at rsanborn@richmond.edu. The University of Richmond is an Equal Opportunity Employer.

303 TEXAS TECH UNIVERSITY invites applications for a permanent faculty position in Accounting beginning Fall 1999. The position will be available at the Assistant rank for teaching and research interest in Accounting Information Systems. Doctorate required. Certification desirable. Texas Tech offers Accounting programs at the undergraduate, master's and doctoral levels. Applications will be considered until position is filled. Apply to Professor Donald K. Clancy, College of Business Administration, Texas Tech University, PO Box 42101, Lubbock, TX 79409. Affirmative Action/Equal Opportunity Employer.

304 UNIVERSITY OF CALIFORNIA, LOS ANGELES—The Anderson Graduate School of Management—Price Waterhouse Chair in Accounting. Nominations are invited for the Price Waterhouse Chair in Accounting at UCLA. An outstanding scholar is sought who is recognized nationally and internationally as a research leader in the field of Accounting, and who is interested in contributing to the education of doctoral, M.B.A., and undergraduate students. The Chairholder, who is expected to provide a leadership role in the educational mission of The Anderson School, will be appointed for an initial term of five years. Applications and nominations should be addressed to Professor Michael J. Brennan, Chairman, Price Waterhouse Chair Search Committee, Anderson School of Management, UCLA, Los Angeles, CA 90095-1481. Under Federal law the University of California may only employ individuals who are legally authorized to work in the United States as established by providing documents specified in the Immigration Reform and Control Act of 1986. UCLA is an Equal Opportunity Employer.

305 UNIVERSITY OF WISCONSIN–WHITEWATER Accounting Department announces a full-time tenure-track faculty position starting August 2000. Responsibilities include teaching undergraduate and/or graduate level accounting courses, along with advising, service and publication/scholarly activities (including grant writing). The minimum qualifications are an earned terminal degree or being close to receiving the degree, and the ability to teach introductory Financial and/or Managerial Accounting. Professional certification desirable. Candidates with research and teaching interests in Financial Accounting are preferred. Candidates with teaching and research interests in Accounting Information Systems or advanced Managerial Accounting will also be considered. Interested persons should apply in writing to Dr. Kenneth Macur, macurk@uww.edu, Department of Accounting–C5019, UW–Whitewater, Whitewater, WI 53190. See web site http://www.uww.edu/business/depts/Acctg/Position.htm for complete details. Applications will be reviewed beginning September 15, 1999. Interviews will also be held at the AAA Annual Convention. UW–Whitewater is an AA/EEO employer. Women and minorities are encouraged to apply.

306 RUTGERS UNIVERSITY SCHOOL OF BUSINESS–CAMDEN invites applications for tenure-track position in Accounting. The rank is open. The candidate should be capable of high-quality research and teaching at both the undergraduate and graduate levels. The school is AACSB accredited. The normal teaching load is two courses (sections) per semester. Salary is competitive and commensurate with qualification. A doctorate in Accounting is required or expected. The University is located in Southern New Jersey and is less than two miles from downtown Philadelphia, with easy access to New York and Washington, D.C. The position will remain open until filled. Rutgers University values diversity and encourages women and ethnic minorities to apply. Representatives from the School of Business will be available to meet with qualified candidates at the August 1999 Annual Meeting of the American Accounting Association. Interested candidates should send resumes to Peter Theodossiou, The Accounting and Finance Area Coordinator, School of Business, Rutgers University, Camden, NJ 08102. Phone: (609) 225-6594. Rutgers University is an Affirmative Action/Equal Opportunity Employer.

307 OKLAHOMA STATE UNIVERSITY School of Accounting invites applicants for a position at the Assistant Professor or Associate Professor rank with a teaching interest in Accounting Information Systems. The appointment is effective either Spring 2000 or Fall 2000. Candidates should possess the Ph.D. or equivalent or be near completion at the time of appointment, strong quantitative research tools and an interest in research and writing, and be an effective classroom teacher. Professional certification is desirable. Applications will be considered until the position is filled. Interested applicants should send resumes and names of references to Lanny G. Chasteen, School of Accounting, College of Business Administration, 401 Business Building, Oklahoma State University, Stillwater, OK 74078-4017. Oklahoma State University is an Equal Employment Opportunity/Affirmative Action Employer.

308 AUBURN UNIVERSITY at MONTGOMERY invites applications for the position of Head of the Department of Accounting and Lowder-Weil Chair at the rank of Associate or Full Professor and an accounting faculty position at the rank of Assistant or Associate Professor for the 1999–2000 academic year with an earlier appointment a possibility. Preference will be given to individuals holding an earned doctorate in Accounting from an AACSB-accredited University, and who demonstrate the ability to provide quality teaching, research and service. Compensation will be competitive, based on an individual's qualifications and experience. The School of Business is accredited by the AACSB at both the graduate and undergraduate levels. Applications will be reviewed as received and will be accepted until the position is filled. Send letters of interest, *curriculum vitae* and names and addresses of three references to Dr. David Sollars, Assistant Dean, School of Business, Auburn University Montgomery, PO Box 244023, Montgomery, AL 36124-4023. Auburn University Montgomery is an EEO/AA Employer.

309 EINDHOVEN UNIVERSITY OF TECHNOLOGY in The Netherlands, Department of Technology Management, is seeking applications for an Assistant Professor position in Managerial Accounting. The department has a very strong research base in operations management and the successful candidate is expected to bring the economic perspective more into the group's research agenda. Candidates should have a Ph.D. in Accounting/Industrial Organization/Microeconomics (e.g., game theory, principal/agency theory, transaction cost economics, auction theory). Candidates should be interested in the application of economic theory to operations management and supply chain management in particular. We offer a stimulating and very international research environment, and a manageable teaching load. Send applications as soon as possible to Dr. Marc Wouters, Eindhoven University of Technology, School of Technology Management, PO Box 513, 5600 MB Eindhoven, The Netherlands. Email: m.j.f.wouters@tm.tue.nl. Applications will be accepted until position is filled.

310 TENNESSEE STATE UNIVERSITY invites applications for two tenure-track positions in the Accounting and Business Law Department (http://www.tnstate.edu/acbl/) at the rank of Assistant/Associate Professor with beginning date open (August 1999, January 2000, August 2000). Candidates must have Ph.D. or D.B.A. in Accounting (ABD considered) and CPA or other professional certification, and record of research leading to publications in refereed journals. Candidates should be qualified in Financial Accounting (intermediate and advanced) to include International or NFP; also AIS or Auditing is desirable. For additional information contact Dr. Bob Cluskey at phone: (615) 963-7170; fax: (615) 963-7139; email: bcluskey@picard.tnstate.edu. To apply submit letter of application, current *curriculum vitae,* and a list of three references to Office of Human Resources, Tennessee State University, 3500 John A. Merritt Boulevard, Nashville, TN 37209-1561 with info copy to Dr. Bob Cluskey, Head, Accounting and Business Law Department, Tennessee State University, 330 10th Avenue North, Box 137, Nashville, TN 37201-3401.

311 NORTHERN ILLINOIS UNIVERSITY anticipates several tenure-track openings for accounting faculty at the Assistant/Associate level, starting August 2000. Due to several retirements over the next two years, candidates in all fields are encouraged to apply. Candidates must be qualified to teach at the undergraduate and graduate levels. Candidates should have, or expect to have, a Ph.D. as of the date employment begins. Teaching experience, business experience and professional certification is desirable. Northern Illinois University emphasizes teaching, research and professional activities. We are particularly interested in faculty who want to combine their research and teaching with a close working relationship with practicing professionals. Interested applicants should send a cover letter and resume to Patrick R. Delaney, Chair, Department of Accountancy, Northern Illinois University, DeKalb, IL 60115. Applications will be accepted until 10/15/99. Northern Illinois University is an Equal Employment Opportunity, Affirmative Action Employer.

312 LOUISIANA TECH UNIVERSITY is seeking applications and nominations for the Harold J. Smolinski Endowed Research Chair in Accountancy (pending final budgetary approval). Applications will be accepted until filled. Candidates must hold a doctoral degree in Accounting, with professional certification preferred. Applicants should provide evidence of excellence in research and teaching. Position requires teaching at the upper division and graduate levels, publishing quality research, participating in professional activities, and serving as a mentor to junior faculty and doctoral students. The College of Administration and Business is AACSB-accredited at the undergraduate and graduate levels, including separate accounting accreditation. Correspondence should be sent to Dr. Thomas J. Phillips, Jr., Director, School of Professional Accountancy, Louisiana Tech University, Ruston, LA 71272. Louisiana Tech University is an Equal Opportunity University (EEO/AA/ADA). Women and minorities are encouraged to apply. Dr. Phillips will be attending the AAA Annual Meeting. (http://www.cab.latech.edu).

313 ADJUNCT FACULTY POSITION. Graduate School of Management. Responsibilities include teaching at least one evening section of the M.B.A.-level required courses, Financial Accounting in the Fall semester and Managerial Accounting in the Spring semester. Each course meets once a week for three hours for 15 weeks. Students are required to complete a midterm exam, final exam and a case/company analysis. Class size is 30–50 students and is taught using brief lectures and problem and case analysis with an emphasis on "real world" applications in a state-of-the-art classroom. Qualified candidate will have an earned Ph.D., be ABD or a doctoral student in Accounting. Prior teaching experience is preferred. This position may lead to a permanent position at the Graduate School of Management. Interested candidates should send a letter of interest and resume to Susan Hass, Simmons College, Graduate School of Management, 409 Commonwealth Avenue, Boston, MA 02215; email: shass@simmons.edu. EOE.

314 MIAMI UNIVERSITY'S Department of Accountancy invites applicants for a tenure-track position at the Assistant rank beginning August 2000 (pending funding). Applicants must have a primary interest in Accounting Information Systems and a Ph.D. (or near completion). Professional certification and experience are desirable. In addition to teaching excellence, faculty are expected to conduct and publish research. Miami University has a national reputation for quality teaching and the Department has accredited programs at both the undergraduate and graduate levels. Visit our web site at http://www.muohio.sba.edu. Miami is an EEO employer. Women and minorities are encouraged to apply. Please submit your resume and names of three references to Dr. James Cashell, Department of Accountancy, R. T. Farmer School of Business Administration, Miami University, Oxford, OH 45056. Application screening will begin immediately.

315 JAMES MADISON UNIVERSITY anticipates recruiting an Assistant Professor (tenure track) in Accounting for the 2000–2001 academic year. Applicants must hold a doctorate in Accounting from an AACSB-accredited institution or be close to completion, be a CPA, and have relevant practical experience. Primary teaching duties include undergraduate and graduate Auditing. The successful candidate must demonstrate proficiency and dedication to use of technology in the classroom. Teaching excellence and a commitment to quality research and service are expected. James Madison University is a selective, state-supported institution located in the historic, scenic Shenandoah Valley. All accounting and business programs are AACSB-accredited. Interviews will be conducted at the AAA Annual Meeting in San Diego. Please send *curriculum vitae* to Professor Donna Street, James Madison University, School of Accounting, MSC 0203, Harrisonburg, VA 22807. JMU is an Equal Opportunity/Affirmative Action/Equal Access Employer and especially encourages applications from minorities, women and persons with disabilities.

316 UNIVERSITY OF AKRON's Daverio School of Accountancy invites applications for a tenure-track position (rank and salary negotiable) starting August 2000 and pending budget approval. The ideal candidate would have primary research and teaching interest in Auditing. Certification and ability to also teach and conduct research in Financial/Managerial Accounting would be an advantage. Applicants should have excellent teaching skills, demonstrated capacity to conduct publishable research, and willingness and ability to work with the professional community. Interested candidates should respond by November 1, 1999 to Alvin Lieberman, Search Committee Chair, Daverio School of Accountancy, University of Akron, Akron, OH 44325-4802.

317 SOUTHERN ILLINOIS UNIVERSITY at EDWARDSVILLE invites applications for a tenure-track position in Accounting beginning in August 2000. A Ph.D. in Accounting is required, but ABDs nearing completion will be considered. Candidates must be qualified to teach Taxation at both the undergraduate and graduate levels and should be qualified in an additional area of accounting (e.g., Financial, Managerial). Professional certification and experience are desirable. Candidates must be committed to excellence in teaching and scholarly research. The Department of Accounting offers AACSB-accredited programs at both the undergraduate and master's levels. SIUE is located on a rural campus of 2,700 acres approximately 20 minutes from downtown St. Louis, MO. Send *curriculum vitae* to Michael L. Costigan, Chair, Department of Accounting, Campus Box 1104, Southern Illinois University at Edwardsville, Edwardsville, IL 62026-1104. Email: mcostig@siue.edu. SIUE is an Equal Opportunity/Affirmative Action Employer, and applications from women and minorities are especially encouraged.

318 THE UNIVERSITY OF SOUTH ALABAMA invites applications to fill one tenure-track position at the Assistant Professor level for Fall 2000. Applicants must have a primary teaching emphasis in Cost and Managerial Accounting. Applicants should possess a Ph.D. in Accounting or be near completion of the dissertation. The Department of Accounting seeks faculty with a strong commitment to teaching excellence balanced with an active interest in research and publication. The Department offers both master's and undergraduate degrees. The College is fully accredited by AACSB. Applications will be accepted until November 15, 1999. Send letter of application and *curriculum vitae* to Search Committee, Department of Accounting, College of Business and Management Studies, University of South Alabama, Mobile, AL 36688. The University of South Alabama is an AA/EEO employer M/F/D.

319 WESTERN ILLINOIS UNIVERSITY seeks candidates with doctorate (ABD considered) or LLM/CPA for opening (contingent upon available funds and approval of the position) commencing January 2000 or August 2000. Area of specialization: Taxation. Other areas may be considered. Teaching experience at upper-division level and CPA desired. Candidates must be committed to teaching excellence and quality research. Rank and salary dependent upon qualifications and experience. WIU's business programs are AACSB-accredited (graduate and undergraduate). WIU is an AA/EO employer. Women, minorities and persons with disabilities are especially encouraged to apply. Applications will be accepted until the position is filled. Send resume to Professor Penelope J. Yunker, Chair, Department of Accountancy, Western Illinois University, Macomb, IL 61455.

320 CLARKSON UNIVERSITY is accepting applications for a tenure-track position teaching Financial and/or Managerial Accounting beginning Fall 1999. All levels will be considered. Appropriate doctoral degree required (ABD considered). Teaching experience preferred. Substantial research is expected of all Clarkson University faculty. Courses to be taught include a broad range of undergraduate and M.B.A. classes. The position could be filled on a visiting basis for the 1999 academic year. Clarkson is a private university located in Potsdam, New York, midway between the St. Lawrence River and the Adirondack Mountains. The School of Business has about 300 undergraduate and 70 graduate majors. Screening for this position will begin immediately and continue until the position is filled. Submit a letter of application, *curriculum vitae* and the names of three references to Dr. Fredric C. Menz, Interim Dean, School of Business, Clarkson University, Potsdam, NY 13699-5765. Clarkson University is an AA/EOE employer. POS# 81-98.

321 IOWA STATE UNIVERSITY Department of Accounting invites applications for a tenure-track position at all ranks. Appointment begins August 16, 2000. Needed areas include Information Systems, Managerial, Tax, and Financial Accounting. An Assistant Professor candidate must exhibit a capacity for quality research and teaching. A candidate for Associate must be an established scholar and teacher. A Full Professor Candidate must be recognized as a top scholar. Other requirements include a Ph.D. in Accounting or a related field (or an advanced stage ABD for an Assistant). Send *curriculum vitae,* a statement of teaching and research interests, and names of three references to David B. Smith, Department of Accounting, Iowa State University, 396 Carver Hall, Ames, IA 50011-2063 or email: smithdb@iastate.edu. Iowa State University is an Affirmative Action/Equal Opportunity Employer.

322 UNIVERSITY OF RHODE ISLAND Department of Accounting invites applications for an Assistant Professor position in the area of Accounting Information Systems (AIS) effective Fall 2000. Applicants should have completed a doctorate from an AACSB-accredited institution, however ABD candidates with significant progress on their dissertation will be considered. Professional certification and both teaching and practical experience in AIS are desired. Candidates with coursework and research in AIS are preferred. Responsibilities include teaching basic and advanced courses in Accounting at the undergraduate and master's level with an emphasis on Accounting Information Systems, course development, student advising, research in AIS and cross-disciplinary research. The position also requires service to the department, college, university and profession. Salary is competitive. Review of applicants will begin 7/15/99 and continue until the position is filled. Candidates should send a letter of application, *curriculum vitae* and Graduate transcripts to Edmund J. Boyle, Search Committee Chair, Accounting Search Committee, Log #041061, University of Rhode Island, PO Box G, Kingston, RI 02881.

323 BABSON COLLEGE invites applicants for a tenure-track accounting faculty position at the Assistant or Associate Professor level to teach Managerial Accounting courses. Visiting positions a possibility. Doctorate is required, ABDs in final stages considered. Professional certification desirable. Babson places top priority on innovative and integrated teaching, and encourages and supports applied research. Qualified candidates should mail resumes to Professor Joanne Williams, Chairperson, Division of Accounting and Law, Babson College, Babson Park, MA 02457. Babson is an Equal Opportunity Employer. Qualified women and minorities are encouraged to apply.

324 OKLAHOMA STATE UNIVERSITY invites applications for the position of Head of the School of Accounting for Fall 2000 appointment at the rank of Professor. Salary is competitive and a Professorship or Chair may attach to the position. Qualifications include a doctoral degree in Accounting from an AACSB-accredited institution and evidence of significant administrative capability and of strong research, teaching and communication skills. Professional certification is desirable. The Head is expected to provide leadership in the pursuit of the School of Accounting's mission of excellence in accounting education, including quality teaching and research, to promote links with professional organizations, and to solicit external support. Applicant screening will begin on October 1, 1999 and continue until the position is filled. Please send application letter and *curriculum vitae* to Search Committee Chair, School of Accounting, College of Business Administration, Oklahoma State University, Stillwater, OK 74078-0555. An Equal Opportunity, Affirmative Action Employer.

325 UNIVERSITY OF MONTANA, The Department of Accounting and Finance anticipates filling one or more tenure-track Assistant Professor positions effective Fall 2000. Applicants must have completed their Ph.D. prior to starting date of employment. Professional certification is desirable. Areas of need include Financial, Managerial, Governmental, and Accounting Information Systems. Successful candidates are expected to teach undergraduate and master's level courses, maintain an active research agenda and engage in service activities. To assure consideration applications should be received by October 31, 1999. Position(s) will remain open until filled. The University of Montana is located in Missoula, Montana, a community of approximately 70,000. Excellent scenery and opportunities for outdoor recreation abound. Information about the University of Montana may be found at http://www.umt.edu and http://www.business.umt.edu. Send a cover letter and resume to Stanley Earl Jenne, Chair of Faculty Search Committee, Department of Accounting and Finance, University of Montana, Missoula, MT 59812-1216. EEO/AA.

326 UNIVERSITY OF LOUISVILLE, Assistant Professor of Accountancy. An appointment as Assistant Professor of Accountancy may be available for Fall 2000. Minimum qualifications are: Ph.D. or DBA in Accounting, strong commitment to student learning, and quality research capabilities. ABDs will be considered only if substantial progress has been made on the dissertation. Preferred area of teaching and research is Auditing/Assurance Services with any secondary interest. Preference will be given for professional experience and/or established teaching and publication record. Deadline for application is October 1, 1999. The Accountancy Program is accredited by the AACSB. Please send a current *curriculum vitae* to Dr. Alan N. Attaway, Director, School of Accountancy, College of Business and Public Administration, University of Louisville, Louisville, KY 40292. AA/EEO.

327 COLLEGE OF CHARLESTON invites applications for tenure-track position in Accounting starting Fall 2000. Ph.D. in Accounting and professional certification are desirable, but ABDs are encouraged to apply. The undergraduate program is AACSB-accredited and the M.S. in Accountancy is currently seeking accreditation. The successful candidate will have a commitment to excellence in teaching, as well as demonstrated research record or research promise. The College of Charleston, is a moderate-sized, four-year public comprehensive university located in the historic district of Charleston, SC. Salary and rank are commensurate with qualifications and experience. Interviews will be conducted at the San Diego AAA Annual Meeting. Interested applicants should send letter of interest, vita and references to Dr. Andrew L. Abrams, Department of Accounting, College of Charleston, 66 George Street, Charleston, SC 29424. Review of applications begins September 11, 1999 until position is filled.

328 NORTHEASTERN UNIVERSITY invites applications for a tenure-track position at the Assistant and/or Associate Professor rank in Accounting effective September 2000. Candidates must possess the doctoral degree and have a strong commitment to excellence in teaching and scholarly research. Candidates with an established publication record, teaching experience and some business background are preferred. Northeastern is a large urban university with the main campus located in the historic and culturally rich Fenway section of Boston. The College of Business Administration is one of nine colleges within the University and has undergraduate, M.B.A., Executive M.B.A., M.S./M.B.A. in Professional Accounting and M.S. Tax Programs. The College is AACSB-accredited. Please send *curriculum vitae* to Dr. Paul A. Janell, Accounting Group, 404 Hayden Hall, Northeastern University, Boston, MA 02115, email: pjanell@CBA.neu.edu. Contact may also be made at the AAA Annual Meeting in San Diego. Northeastern is an Equal Opportunity/Affirmative Action Employer.

329 WESTERN MICHIGAN UNIVERSITY's Haworth College of Business Department of Accountancy invites applications for two Financial/Managerial tenure-track positions at the Assistant Professor level beginning Fall 2000. Candidates must have a Ph.D. with an Accounting major (or ABD with completion by end of 2000). Western Michigan University enrolls approximately 26,000 students, with 25 percent at the graduate level. The Haworth College of Business enrolls about 3,500 students. Both the College and the Department of Accountancy are accredited by the AACSB at both the undergraduate and graduate levels. Please direct applications and inquiries to Professor Roger Tang (roger.tang@wmich.edu) Haworth College of Business, Department of Accountancy, Western Michigan University, Kalamazoo, MI 49008-3805, no later than August 6, 1999 to ensure being considered for an interview at the AAA Annual Meeting in San Diego. Western Michigan University is an Affirmative Action/Equal Opportunity Employer and has a strong commitment to the principle of diversity.

330 UNIVERSITY OF CALIFORNIA, RIVERSIDE, The A. Gary Anderson Graduate School of Management, Visiting Professor in Accounting. The A. Gary Anderson Graduate School of Management at the University of California, Riverside invites applications for a Visiting Professor (rank open) position in the area of Auditing and Financial Accounting, to start in July 1999. Candidates should have a doctoral degree in Accounting and must have demonstrated potential for excellence in teaching and research. Candidates are expected to teach at both the graduate and undergraduate levels. Compensation will be competitive and will be commensurate with the candidate's qualifications and experience. Applications will be accepted until the position is filled. Please send a letter of application, *curriculum vitae* and names of three references to Professor Woody M. Liao, The A. Gary Anderson Graduate School of Management, University of California, Riverside, Riverside, CA 92521-0203. Telephone: (909) 787-6451; Fax: (909) 787-3970. The University of California, Riverside is an Affirmative Action/Equal Opportunity Employer.

331 UNIVERSITY OF SOUTH FLORIDA (Main Campus), School of Accountancy invites applications for the position of Assistant/Associate Professor specializing in Income Taxes. Position involves active participation in a Master of Accountancy program with concentration in Tax, undergraduate teaching, and the opportunity to be involved with the Ph.D. program. Primary teaching responsibilities are on the Tampa campus with occasional assignments on regional campuses. Other duties include research leading to publications in refereed journals and service to the School, College, University and professional communities. Ph.D. or near completion is required; professional certification is desirable. Submit applications to Robert M. Keith, Director, School of Accountancy, College of Business Administration, University of South Florida, 4202 E. Fowler Avenue, BSN 3403, Tampa, FL 33620-5500. For additional information, phone: (813) 974-4186; fax: (813) 974-6528; email: rkeith@coba.usf.edu. Position is subject to funding; application deadline is October 29, 1999. USF is an Equal Opportunity Equal Access/Affirmative Action Institution.

332 COLLEGE OF WILLIAM AND MARY seeks to fill one or two tenure-track positions in Accounting at the Assistant/Associate level beginning Fall 2000. Applicants must have a doctoral degree (or be near completion for Assistant position) and must demonstrate an ability to publish high-quality research. Commitment to excellence in both teaching and research is essential. Experience/interest in information technology is considered a plus. Candidates should send a *curriculum vitae*, samples of scholarly work, teaching evaluations, and two letters of reference to Professor Kim Smith, Graduate School of Business Administration, College of William and Mary, PO Box 8795, Williamsburg, VA 23187-8795. Review will begin July 1, 1999, and materials will be accepted until an appointment is made. The College of William and Mary is an Equal Opportunity/Affirmative Action Employer. Members of under-represented groups (including women, people of color and persons with disabilities) are strongly encouraged to apply.

333 COLLEGE OF WILLIAM AND MARY seeks to fill one or two visiting positions in Accounting for the 1999–2000 academic year. Applicants should have recent successful experience in teaching the M.B.A. core class in Financial Accounting, Financial Accounting at the intermediate level and above, or Accounting Systems, as well as experience with a well-qualified student population. Send *curriculum vitae*, samples of scholarly work, teaching evaluations, and two letters of reference to Stuart L. Williams, Associate Dean, School of Business Administration, College of William and Mary, PO Box 8795, Williamsburg, VA 23187-8795; (email: stu@business.wm.edu; fax: (757) 221-2937). For information about the school, visit our web site at http://www.business.wm.edu. Review of materials begins May 17, 1999, and will continue until an appointment is made. The College of William and Mary is an Equal Opportunity/Affirmative Action Employer. Members of under-represented groups (including women, people of color, and persons with disabilities) are strongly encouraged to apply.

334 MARIST COLLEGE invites applications for Assistant Professors of Accounting starting Fall 2000. The ideal candidates should have an interest in teaching a variety of accounting courses. Candidates may pursue any area of specialization and will have the opportunity to teach graduate-level courses as well. Marist is a liberal arts college located in Poughkeepsie, NY. It places strong emphasis on students and teaching excellence. Research support is available. The School is in Candidacy Status for AACSB accreditation. A Ph.D. in Accounting is required. Professional certification would be desirable. Candidates are encouraged to visit our web site at http://www.marist.edu. Review of applications will begin on October 15 and continue until the position is filled. Please send a current *curriculum vitae*, letter of interest, and contact information for at least three professional references to Dr. Gordon J. Badovick, School of Management, MPO Box 905/AR, Marist College, Poughkeepsie, NY 12601.

335 OREGON STATE UNIVERSITY has an anticipated opening for a tenure-track faculty position at the Assistant/Associate Professor level beginning September 2000. Rank is dependent upon qualifications. Preference will be given to candidates in Auditing. Responsibilities include quality teaching, research and professional activities in the field of Accounting. Candidates should hold the appropriate doctorate. Professional certification is desirable. Salary is competitive; fringe benefits are excellent. In addition to a *curriculum vitae*, the applicant must include information indicating teaching effectiveness and scholarly activity and a statement of intent that includes professional goals and educational philosophy. Applications should be sent to Dr. Ilene K. Kleinsorge, Chair–Accounting, Finance, and Information Management, College of Business, 200 Bexell Hall, Oregon State University, Corvallis, OR 97331-2603, telephone number: (541) 737-4276. OSU is an AA/EEO employer and has a policy of being responsive to the needs of dual-career couples. For full consideration apply by September 30, 1999. Applications will be accepted until position is filled.

336 BUCKNELL UNIVERSITY seeks a tenure-track faculty member to teach Introductory Accounting and upper-level courses in Managerial or Financial Accounting beginning Fall 2000. An opportunity exists occasionally to teach nonaccounting or graduate-level courses. Preference will be given to candidates who have undergraduate teaching experience, the ability to conduct publishable research, and have relevant professional experience. Professional certification (CPA, CMA, CIA) and/or the ability to teach in other accounting subdisciplines are desirable. The appointment will be made at the rank of Assistant Professor. Candidates currently holding tenure-track appointments may receive up to three years of credit toward tenure. Qualified candidates will have completed, or be in the final stages of completing, the doctoral degree. AACSB competitive salary. For complete details contact Dr. Stephen D. Willits, Department of Management, Bucknell University, Lewisburg, PA 17837. Applications will be reviewed beginning September 1, 1999. Interviews will be held at the AAA Annual Meeting. EEO/AA.

337 AMERICAN UNIVERSITY invites applications for tenure-track appointments in Accounting beginning Fall 2000. Doctorate required and professional certification desired. An Information System perspective will be viewed positively. We have an open senior rank position with the intention of attracting a scholar with an established record of high-quality publications and a genuine interest in serving as mentor to junior faculty. Candidates are expected to provide evidence of high-quality teaching ability and a commitment to professional accounting education. At the junior level (subject to budgetary approval), we are seeking applicants with strong research potential and quality teaching ability. Our programs have AACSB business and accounting accreditation. Representatives will be attending the Annual Meeting at San Diego. To apply, please send a resume, three letters of recommendations, and copies of teaching evaluations to Dr. Ajay Adhikari, Chair, Accounting Search Committee, Kogod College of Business, American University, 4400 Massachusetts Avenue, NW, Washington, D.C. 20016-8044. Equal Opportunity/Affirmative Action Employer.

338 UNIVERSITY OF HAWAII anticipates recruiting for Assistant Professor(s) in Accounting beginning Spring or Fall 2000. The tenure-track position(s) are subject to anticipated funding. Applicants must have an earned doctorate in Accounting from an AACSB-accredited institution or be close to completion. A CPA certificate, relevant practical experience, international research, or experience teaching in a multi-cultural environment would be a plus. All areas of teaching are needed. New faculty teach six hours a semester and are expected to publish quality research. The University of Hawaii is a state-supported school located in scenic Honolulu. For more information about the College visit our web site at http://www.cba.hawaii.edu. Interviews will be conducted at the AAA Annual Meeting in San Diego. To arrange an interview please send resume to Professor Terry Gregson, Chair of the Recruiting Committee, College of Business Administration, School of Accountancy, University of Hawaii at Manoa, 2404 Maile Way, BusAD A-414, Honolulu, Hawaii 96822.

339 TRUMAN STATE UNIVERSITY. The Division of Business and Accountancy is seeking candidates for a tenure-track Accounting Information Systems position. Teaching responsibilities include undergraduate and/or graduate accounting courses, primarily Accounting Information Systems, research, academic advising, and service. Truman State University is Missouri's only highly selective public liberal arts and sciences university. The Division enrolls 1,100 business and accounting majors with B.A. and B.S. degrees in Accounting and Business Administration and a master's degree in Accountancy. The business and accounting programs are both accredited by AACSB. A Ph.D. degree with an emphasis in Accounting Information Systems is preferred. Evidence of ongoing scholarly activity. Send letter of application, resume, three recent letters of application, and graduate and undergraduate transcripts to Dr. Robert A. Dager, Head, Division of Business and Accountancy, Truman State University, Violette Hall 2400, Kirksville, MO 63501. An EEO Employer committed to cultural diversity and compliance with ADA.

340 LOUISIANA STATE UNIVERSITY, Department of Accounting in the E. J. Ourso College of Business Administration invites applications for three anticipated tenure-track openings to begin August 2000. Applications at the Assistant and Associate rank will be considered in all disciplines. Applications at the Associate or Full rank will be considered with a specialty in Financial Accounting. The Assistant rank positions require that the doctoral degree in Accounting be completed, or near completion, by the date of appointment. If degree is not completed by date of appointment, rank will be at Instructor level. CPA preferred. Faculty are expected to teach undergraduate and graduate courses, be actively involved in academic research, and provide service to the profession and the university. Applications will be accepted until November 1, 1999 and will continue until candidates are selected. Please send a letter of application, *curriculum vitae,* and references to Don W. Finn, Chair, Department of Accounting, 3101 CEBA Building, Louisiana State University, Ref: Log #1128, Baton Rouge, LA 70803. LSU is an Equal Opportunity/Equal Access Employer.

341 LOUISIANA STATE UNIVERSITY, Department of Accounting in the E. J. Ourso College of Business Administration is seeking applications for tenured or tenure-track appointment to the Thomas H. Daigre Endowed Chair of Business Administration. Candidate must have a record of scholarly distinction, commitment to teaching and demonstrated success in mentoring graduate students. Responsibilities will include teaching primarily at the graduate level; advise and mentor students; assist untenured faculty in developing a scholarly record, chair and serve on dissertation committees, provide service to the department, college, university, and the profession; continue to perform scholarly research with the expectation of publication in top journals. Anticipated hire date is August 2000, pending final approval. Application deadline is November 1, 1999 or until candidate is selected. Submit letter of application, three (3) letters of recommendation, and resume to Don W. Finn, Chair, Department of Accounting, E. J. Ourso College of Business, Louisiana State University, Baton Rouge, LA 70803; (225) 388-6506. LSU is an Equal Opportunity/Equal Access Employer.

342 GRAND VALLEY STATE UNIVERSITY, Department of Accounting and Taxation, which has separate AACSB accreditation, will fill a tenure-track position for Fall 2000. Preference will be given to candidates with research and teaching interests in Accounting Information Systems, but exceptional candidates in nonaccounting information systems fields are encouraged to apply. The successful candidate will take the lead working with other departments in developing a technology core for the business school. Rank is open. An Assistant Professor should demonstrate teaching ability and research potential. The Associate or Full Professor position requires a strong teaching and publication record. Salary is competitive. Teaching load is nine hours (three sections) per semester. Send a letter of application, *curriculum vitae,* research paper or dissertation chapter, teaching evaluations and names of three references to Search Committee Chair, Department of Accounting and Taxation, Grand Valley State University, 301 W Fulton, Grand Rapids, MI 49504. GVSU is an AA\EO\ADA employer.

343 LE MOYNE COLLEGE is seeking applicants for an Associate or Full Professor in Accounting beginning Fall 2000. A Ph.D. in Accounting is required. Preference will be given for possession of a CPA with public accounting audit experience. Applicants should be excellent teachers with an established record of research. Le Moyne is a high-quality, private, four-year liberal arts college in the Jesuit tradition with a very successful accounting program, which graduates approximately 65 majors per year. The school is entering its third year of Candidacy Status for AACSB accreditation. Salary is competitive. Send *curriculum vitae* by October 15, 1999 to Chair of Accounting Department Search Committee, c/o Lynn McMartin, Le Moyne College, 1419 Salt Springs Road, Syracuse, NY 13214-1399. Le Moyne College is an Equal Opportunity Employer and encourages women, persons of color, and Jesuits to apply for employment.

344 UNIVERSITY OF NEW HAMPSHIRE's Whittemore School of Business and Economics invites applications for a tenure-track position in Accounting at the Assistant or the Associate Professor level beginning Fall 2000. Applicants at the Assistant level must have a doctoral degree or be near completion. Applicants at the Associate level must have a proven track record. Interested applicants should submit a letter of interest, current *curriculum vitae,* recommendation letters, recent teaching evaluations, and evidence of scholarly work to Professor John Freear, Whittemore School of Business and Economics, Box A, McConnell Hall, University of New Hampshire, Durham, NH 03824, telephone number: (603) 862-3376; email: jfreear@hopper.unh.edu. Representatives from the Whittemore School plan to interview candidates at the AAA Annual Meeting in San Diego. This position is subject to budgetary approval. The School is accredited by the AACSB. UNH is committed to excellence through diversity among its faculty and strongly encourages women and minorities to apply.

香港中文大學
THE CHINESE UNIVERSITY OF HONG KONG

Faculty Positions in the School of Accountancy

The Chinese University of Hong Kong is a comprehensive university offering programmes up to PhD level in the Humanities, Business Administration, Education, Engineering, Medicine, Science and Social Science (including Architecture). The University has a large and scenic campus (over 134 hectares), occupying a hillside in the New Territories facing Tolo Harbour. The University is very active in promoting research and consultancies and in liaising with the industrial and business sectors worldwide.

The School of Accountancy is one of seven academic departments in the Faculty of Business Administration. The departments have established academic reputation and our MBA programme has been consistently rated among the top in Asia. Our business administration and accounting programmes are fully accredited by AACSB-IAME. As a pioneer and leader in accounting education in Hong Kong and Asia since 1963, the School has established an excellent reputation for professional education and research, offering BBA, MAcc, MPhil and PhD degrees in accountancy. Our 560 accounting major students are of first class calibre and very much sought-after by employers in the Asian Pacific region.

To further enhance our role as an international centre for quality accounting education and research, established and promising accounting scholars in all fields of accounting around the world are invited to join our strong and devoted faculty team. The School currently has 24 full-time and several visiting academic staff. Applications are invited for the posts of Lecturer (carrying the academic title of Assistant Professor or Associate Professor, as appropriate) or Senior Lecturer (carrying the academic title of Associate Professor or Professor, as appropriate). Applicants should have a PhD (or nearing completion). A professional accounting qualification or other relevant certification is desirable but not a must. Candidates must be willing to teach at undergraduate and postgraduate levels, as well as day-time and evening classes. Commitment to quality teaching, scholarly research and service to the School/University is required. The medium of instruction is English and/or Chinese. There will be full-time and part-time teaching assistants to assist teachers in teaching and other academic activities. State-of-the-art facilities and generous research grant opportunities are available to support research activities.

The range of annual salary (12 months) is approximately from US$71,000 to US$119,000 for appointment at the grade of Lecturer, and from US$110,000 to US$148,000 at the grade of Senior Lecturer. Starting salary and grade will be commensurate with qualifications and experience. Benefits include leave with full pay, medical and dental care, children's education allowance and housing benefits. Appointment will initially be made on a fixed-term contract basis for up to three years and will carry a contract-end gratuity (up to 15% of basic salary) where appropriate.

Applications with full resume and names and addresses (fax numbers/e-mail addresses as well where available) of three referees should be addressed to Professor Simon S.M. Ho, Director, School of Accountancy, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong. Please quote the reference number 99/043(020)/2 and mark *"Recruitment - Confidential"* on cover. Details about the University and the School can be found on our web site: http://www.cuhk.edu.hk/acy. For additional information, please fax [number (852)2603 6604] or e-mail <simon@baf.msmail.cuhk.edu.hk> to the School of Accountancy. Applications will be accepted until positions are filled.

WAKE FOREST
UNIVERSITY
Babcock Graduate
School of Management

ACCOUNTING FACULTY POSITION

The Babcock Graduate School of Management at Wake Forest University seeks qualified candidates for a fall 2000 tenure-track position in accounting. Individuals with an interest in teaching managerial accounting topics and the ability to teach MBA-level financial accounting are preferred.

For this experienced assistant, associate or full professor position, the Babcock School seeks an individual with strong teaching skills and a developed research program. The individual must be at least three years beyond the receipt of the doctorate with a record of high-quality research publications.

Normal teaching loads are the equivalent of four semester-length courses per year. Because of our integrated curriculum, it is important that selected candidates be able to interact and work closely with faculty from other disciplines.

Wake Forest University is a well-endowed private institution with a total enrollment of 6,000. The University is located in the heart of the Piedmont region of North Carolina, in a metropolitan area of approximately one million.

The Babcock Graduate School of Management offers only AACSB-accredited MBA-level degree programs. Recently ranked 36th by *U.S. News & World Report,* Babcock has an enrollment of 650 and a faculty of 38. We provide generous allowances for travel and research and an outstanding compensation and benefits package. We are particularly interested in receiving applications from qualified minority and female candidates.

Interested candidates should contact:

Ken Middaugh
Associate Professor of Management
Babcock Graduate School of Management
Wake Forest University
P.O. Box 7659
Winston-Salem, NC 27109-7659
ken.middaugh@mba.wfu.edu

Applications will be accepted until January 1, 2000.
AFFIRMATIVE ACTION, EQUAL OPPORTUNITY

THOMAS H. DAIGRE

ENDOWED CHAIR OF BUSINESS ADMINISTRATION

The Department of Accounting in the E. J. Ourso College of Business Administration at **Louisiana State University** seeks applications for tenured or tenure-track appointment to the Thomas H. Daigre Endowed Chair of Business Administration.

The following qualifications are required. Doctoral degree in accounting. Record of scholarly distinction evidenced by publications in the top echelon accounting journals. Commitment to teaching and demonstrated success in mentoring graduate students. Experience in teaching doctoral seminars and directing dissertations. Significant service history to the profession.

Responsibilities: teach primarily at the graduate level; advise and mentor students; assist untenured faculty in developing a scholarly record, chair and serve on dissertation committees, provide service to the department, college, university, and the profession; continue to perform scholarly research with the expectation of publication in top journals.

Anticipated hire date is August 2000, pending final approval. Application deadline is November 1, 1999 or until candidate is selected. Submit letter of application, three (3) letters of recommendation, and resume to:

Don W. Finn, Chair
Department of Accounting
E. J. Ourso College of Business Administration
Louisiana State University
Baton Rouge, LA 70803
(225) 388-6506

Louisiana State University at Baton Rouge is the state's only comprehensive University with an enrollment of approximately 30,000 students. LSU is classified as a Carnegie Research I institution. The Department of Accounting offers an undergraduate degree, an MS degree, and a Ph.D. degree. Information about LSU can be obtained by visiting the LSU home page (www.lsu.edu).

LSU IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

Carlson-KPMG Research Professorship in Accounting

The University of Iowa Department of Accounting seeks applications for the Carlson-KPMG Research Professorship in Accounting. Candidates should have a demonstrated record of:

- Influential publications in top academic accounting journals,
- Excellence in teaching and service, and
- Strong leadership skills.

The candidate's overall record must be consistent with University standards for appointment at the rank of full professor.

The Carlson-KPMG Professor will play a key role in the department and the college. Expected activities include, but are not limited to, making important scholarly and professional contributions, teaching in undergraduate and graduate programs, mentoring doctoral students and junior faculty, and fostering strong ties with the business community. Review of applications will begin in October 1999, and will continue until the position is filled. Please send a letter of interest and a vita, or nominations to: The Recruiting Coordinator, The University of Iowa, Dept. of Accounting, Henry B. Tippie College of Business, 108 Pappajohn Business Bldg., Suite W252, Iowa City, IA 52242-1000.

The University of Iowa is an Affirmative Action, Equal Opportunity Employer. Women, minorities and individuals with disabilities are encouraged to apply.

ANNOUNCEMENT FOR TENURE-TRACK FACULTY POSITIONS
DEPARTMENT OF ACCOUNTING
HENRY B. TIPPIE COLLEGE OF BUSINESS
THE UNIVERSITY OF IOWA

The University of Iowa Department of Accounting invites applicants for tenure-track appointments beginning Fall 2000. We will consider candidates in all areas and ranks. We also will consider one- or two-year visiting appointments if we are unable to fill the anticipated position(s) with tenure-track faculty. Required qualifications include a demonstrated interest in and capacity to do research publishable in top-tier accounting journals, a high level of teaching competence, and an earned doctorate (entry-level candidates can be near completion). We offer a competitive compensation package. We will begin screening non entry-level applicants in October 1999, and will screen entry-level applicants from January 2000. To apply, please send a résumé, representative research output, evidence of teaching capabilities, and at least three recommendation letters to: The Recruiting Coordinator, The University of Iowa, Dept. of Accounting, Henry B. Tippie College of Business, 108 Pappajohn Business Bldg., Suite W252, Iowa City, IA 52242-1000.

The University of Iowa is an Affirmative Action, Equal Opportunity Employer. Women, minorities and individuals with disabilities are encouraged to apply.

NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

SCHOOL OF ACCOUNTANCY AND BUSINESS

Faculty Appointments in Financial & Management Accounting and Auditing & Taxation

Applications are invited for faculty positions in the School of Accountancy and Business. Th School offers undergraduate degrees in Accountancy and Business, graduate degrees b research, and MBA degrees. Applicants are expected to possess a relevant higher degre and/or an appropriate professional qualification, with sound teaching, professional or researc experience. We are presently recruiting faculty for the following areas:

- **Financial Accounting**
- **Management Accounting**
- **Auditing/IS Audit**
- **Taxation**

Gross annual emoluments (for 12 months) range as follows:

Professor	:	S$145,300 - S$204,800	Assistant Professor	:	S$ 57,660 - 98,320
Associate Professor	:	S$ 82,680 - S$172,410			

(US$1.00 = S$1.72 approximately as at 25 March, 1999)

The commencing salary will depend on the candidate's qualifications, experience and the level o appointment offered.

In addition to the above, the University may decide to pay an annual variabl component/allowance, which has in the past years ranged from 1 month's to 3 months' salary.

Leave and medical benefits will be provided. Other benefits, depending on the type of contrac offered, include provident fund benefits or an end-of-contract gratuity, passage assistance an baggage allowance for transportation of personal effects to Singapore, subsidized housing an children's education allowance. Staff members may undertake consultation work subject to th approval of the University, and retain consultation fees up to a maximum of 60% of their gros annual emoluments in a calendar year.

Applicants should send their curriculum vitae, including their areas of research interest, list c publications and the names and addresses (as well as internet addresses and telefax numbers, any) of three referees, who will be contacted to : Director of Personnel, NANYAN TECHNOLOGICAL UNIVERSITY, Personnel Office, Administration Building, Level 4, Nanyan Avenue, Singapore 639798. Telefax : (65) 7919340 or Internet address: cclim@ntu.edu.sg. Applicants with internet access should complete the application form and send it together wit their curriculum vitae. The application form may be downloaded from the Personnel Office' homepage at the University's website: http://www.ntu.edu.sg

香港城市大學
City University
of Hong Kong

Anniversary
十五周年校慶

City University of Hong Kong is a well-established degree-granting institution in Hong Kong directly funded by the Government of the Hong Kong Special Administrative Region through the University Grants Committee. It has embarked on an ambitious strategic plan to become one of the leading universities in the Asia-Pacific region by achieving excellence in teaching and research. The student population for 1998-99 is approximately 18,500. The medium of instruction is English.

Applications are invited for the following Professorship appointment :

Professor in the Department of Accountancy *[Ref. B/435/35]*

The Faculty of Business has well-established undergraduate and postgraduate degree programmes, and an increasing number of students registered on the MPhil and PhD research degree programmes. It has an academic staff strength of 170 with six departments namely Accountancy, Economics and Finance, Information Systems, Management, Management Sciences and Marketing. The Faculty members have a proven record of publishing in top tier international academic journals.

Being one of the largest business schools in Asia, the Faculty places heavy emphasis on quality research and innovative teaching. It is at the cutting edge in Asia in the use of information technology and indigenous case studies in its undergraduate and postgraduate programmes. To maintain its competitiveness in the 21st century, the Faculty also establishes a very strong partnership with the private sector in its innovative learning process. A recent project is the joint venture with the Hongkong Telecom, the largest Telecommunication Company in Hong Kong, to offer an MBA degree using the world's first interactive television and broadband internet.

The main focus of research in the Department of Accountancy is on accounting issues related to the interface between corporate governance and economics in the Asia-Pacific region. Apart from having a track publishing record, members in the Department also hold key positions in local and international professional and academic associations.

Qualifications for Appointment

The field of specialisation of the appointee is open but the University is looking for candidates of the highest calibre with appropriate research and teaching experience, and a strong publication record in international referred journals. Applicants are expected to have an international reputation with a proven record of leadership and administrative skills.

The University also accepts nominations.

Salary and Conditions of Service

Salary is within a professorial range and will not be less than HK$102,440 per month.
(Exchange rate : US$1 = HK$7.8 approximately)

Appointment may be on superannuable terms with provision for retirement benefits or on fixed term gratuity-bearing contract with contract-end gratuity. Excellent fringe benefits include 46 days' annual leave, housing, passage allowance and medical and dental care provision.

Application and Information

Further information on the post and the University is available on the University's World Wide Web home page http://www.cityu.edu.hk or the University's listserver accessed by E-mail at "hrmail@ctylnk.cityu.edu.hk", or from the Human Resources Office, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong (Fax: (852) 2788 1154 or (852) 2788 9334/E-mail:hrrecrut@cityu.edu.hk). Please send nomination or application with a current curriculum vitae and the names and addresses of three academic referees at full professorial or other appropriate level to the Human Resources Office by 31 July 1999. Please quote the reference of the post in the application and on the envelope. Further information can be obtained from Prof. Richard HO, Dean of Faculty of Business at Personal Fax No. (852) 2788 7182 or E-mail: fbrykho@cityu.edu.hk.

The Hong Kong Polytechnic University
Department of Accountancy

Position Openings—Assistant, Associate, or Full Professor

Candidates must have a PhD in hand (or be near completion), evidence of teaching ability and a strong research track record/potential. Practical professional experience and professional designation will be an advantage. Although we have stronger needs in the financial and managerial areas, other expertise will be considered for candidates with outstanding credentials. Faculty members are free to pursue any areas of research, but those interested in applying rigorous research paradigms to China-related research issues will find the Department's network and resources particularly helpful. In the year past, members in our department published in such places as *JAE, CAR, JFQA, AH, JAAF, JBFA.* **Visiting positions** are also available for individuals who can make a contribution toward improving the quality and quantity of our research output. Please direct all inquiries to Joseph Cheung by email [acjoe@inet.polyu.edu.hk], phone [(852) 2766-7046], fax [(852) 2365-9303], or post [Department of Accountancy, The Hong Kong Polytechnic University, Hung Hom, Hong Kong]. For further information about us, please visit our web site [http://www.polyu.edu.hk/acct/].

PLACEMENT ADVERTISING POLICY

Placement ads will be published in one issue of *The Accounting Review* and/or posted on the AAA web site for up to six months (please indicate suggested start and end date).

Size

Position wanted notices are limited to 100 words or less. Positions available are limited to 150 words or less.

Rate

Full and associate members of the AAA who are seeking employment are entitled to one free personal placement advertisement per year.

Nonmembers (such as departments, university organizations or individuals) can purchase a placement advertisement for $250.

Deadlines

Issue of *The Accounting Review*	Ad must be received by:
January	November 1
April	February 1
July	May 1
October	August 1

Submission

Placement ads must be submitted electronically. Please indicate primary area (Auditing, Cost Accounting, Financial Accounting, Governmental Accounting, Information Systems, Managerial Accounting, Tax Accounting, etc.) and when the position is available/desired. Email submissions to AAAjudy@packet.net or send disk and hard copy to:

Placement Advertising
American Accounting Association
5717 Bessie Drive
Sarasota, FL 34233-2399
Phone: (941) 921-7747 ext. 305

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THE ACCOUNTING REVIEW
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BRUCE K. BILLINGS
Revisiting the Relation between the Default Risk of Debt and the Earnings Response Coefficient

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A QUARTERLY JOURNAL OF THE
AMERICAN ACCOUNTING ASSOCIATION

AMERICAN ACCOUNTING ASSOCIATION

The members of the 1999–2000 Executive Committee of the Association are as follows:

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The American Accounting Association was founded in 1916 as the American Association of University Instructors in Accounting. Its present name was adopted in 1936. The Association is a voluntary organization of persons interested in accounting education, research, and practice. Full membership entitles one to receive *Accounting Education News*, a selection of one, two, or all three of the Association-wide journals (*The Accounting Review, Accounting Horizons,* and *Issues in Accounting Education*) and the opportunity to purchase Association publications at a discount.

Membership in the Association is available at the following annual rates:

Full membership:
The membership dues are based on the selection of one, two, or all three of the following Association-wide journals: *The Accounting Review, Accounting Horizons,* and *Issues in Accounting Education.*
(This does not include Section journals.)

Select one Association-wide journal	U.S. $85.00
Select two Association-wide journals	U.S. $95.00
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Associate membership for students residing in the United States and Canada:

Select one Association-wide journal	U.S. $20.00
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In addition, full members may belong to one or more Sections: Accounting, Behavior and Organizations; Accounting Programs Leadership Group; American Taxation Association; Artificial Intelligence/Emerging Technologies; Auditing; Financial Accounting and Reporting; Gender Issues in Accounting; Government and Nonprofit; Information Systems; International Accounting; Management Accounting; Public Interest; Teaching and Curriculum; and Two-Year College. Each Section assesses its own annual dues which are collected by the Association.

Subscriptions to *The Accounting Review* are available at the annual rate of U.S. $110.00, effective January 1, 1998.

Periodical postage paid at Sarasota, Florida and at additional mailing offices. POSTMASTER: Send address changes to American Accounting Association, 5717 Bessie Drive, Sarasota, FL 34233-2399.

Editorial correspondence and all manuscripts should be sent to Professor Linda S. Bamber, Editor, *The Accounting Review*, Tull School of Accounting, College of Business Administration, University of Georgia, 255 Brooks Hall, Athens, GA 30602-6252.

The submission fee of $75.00 for members of the AAA or $100.00 for nonmembers must accompany manuscripts when submitted. Books for review should be sent to Professor Thomas H. Williams, Accounting Area, McIntire School, University of Virginia, Charlottesville, VA 22903-2493. Request for reprint permission, subscriptions, advertisements and dues should be sent to American Accounting Association, 5717 Bessie Drive, Sarasota, FL 34233-2399 • Telephone: (941) 921-7747 • Fax: (941) 923-4093 • Email: AAAhq@packet.net. Notice of change of address should be mailed at least eight weeks in advance to ensure undelayed receipt of *The Accounting Review*.

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A QUARTERLY JOURNAL OF THE
AMERICAN ACCOUNTING ASSOCIATION

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Gerald L. Salamon
Associate Editors
Stanley Baiman · Mark W. Nelson
Mary E. Barth · Jamie H. Pratt
Dan S. Dhaliwal · Brett Trueman

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The Value Relevance of Financial Statement Recognition vs. Disclosure: Evidence from SFAS No. 106

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ABSTRACT: This study examines whether the market values financial statement data differently if it is disclosed instead of recognized in the body of the financial statements. We identify a sample of 229 SFAS No. 106 adopters who disclose an estimate of their anticipated liability for retiree benefits other than pensions (PRB) in their financial reports prior to the year of recognition. We then test whether the disclosed estimate of the PRB liability is valued differently by the market than is the subsequently recognized PRB liability. We provide modest and model-sensitive evidence that the recognized PRB liability receives more weight than the disclosed liability in market value association tests.

Key Words: *Disclosure, Recognition, Valuation, SFAS No. 106.*

Data Availability: *The data used in this study are publicly available from the sources indicated in the text. A list of the sample firms is available from the authors.*

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I. INTRODUCTION

This study examines the market's weighting of firms' obligations for postretirement benefits other than pensions (PRB) measured under Statement of Financial Accounting Standards No. 106, *Employers' Accounting for Postretirement Benefits Other Than Pensions* (FASB 1990) before and after formal recognition. The FASB contends that disclosure is not a substitute for recognition (SFAS No. 106, para. 164). Our analysis evaluates this contention by testing whether the market prices pre-SFAS No. 106 PRB liability disclosures (hereafter, "disclosed liabilities") at a different rate than the subsequently recognized (post-SFAS No. 106) liabilities (hereafter, "recognized liabilities").

Bernard and Schipper (1994, 24) state that a question central to many accounting debates is whether market agents treat disclosed and recognized amounts equivalently. However, because of difficult design issues, few empirical studies examine this question. The length of the SFAS No. 106 transition period together with the magnitude of the pronouncement's effect provides a unique opportunity to address the above research question and mitigate many of the design issues raised in Bernard and Schipper (1994). By explicitly distinguishing between recognized and disclosed PRB liabilities, our research also extends the literature examining the impact of PRB accounting information on stock prices (see, for example, Amir 1996; Choi et al. 1997).

The results indicate that both PRB liabilities *disclosed* under SEC Staff Accounting Bulletin No. 74 (SEC 1987) prior to adoption of SFAS No. 106 and those *recognized* subsequent to adoption significantly contribute to explaining stock prices. We also provide some evidence that suggests PRB liability disclosures affect stock prices less than do the later recognized PRB liabilities. However, this latter evidence is not robust across alternative specifications of the balance sheet designs that are used to determine the value relevance of the PRB liabilities. The lack of robustness means that the results are not definitive and they are subject to alternative interpretations depending upon which specification is viewed as the most appropriate one. The evidence of significant differences between the disclosed and recognized PRB liabilities generally comes from specifications in which multicollinearity is less problematic than the specifications in which no significant differences are found. We, therefore, interpret the results as modest and tentative support for the idea that the market attaches less weight to disclosed items than to recognized items.

The second section of the paper discusses related prior research and institutional background. The third section describes the research design and sample, and the fourth section discusses the results. The final section draws conclusions and offers implications of the study.

II. PRIOR RESEARCH AND INSTITUTIONAL BACKGROUND

Recognition vs. Disclosure

Accounting standards require certain information to be *recognized* in the body of the financial statements and other information to be *disclosed*. Statement of Financial Accounting Concepts No. 5, *Recognition and Measurement in Financial Statements of Business Enterprises* (FASB 1984a, para. 6) defines recognition as:

> the process of formally recording or incorporating an item into the financial statements of an entity as an asset, liability, revenue, expense, or the like. Recognition includes depiction of an item in both words and numbers, with the amount included in the totals of the financial statements.

SFAC No. 5 (para. 9) does not give a direct definition of disclosure, but implies that disclosure is any depiction that does not meet the definition of recognition.

When using the terms *recognition* and *disclosure* in this study, we follow the explicit or implicit definitions given above. Recognition means that an amount has been recorded using double-entry accounting and included in the totals of the income statement or balance sheet. In contrast, we define disclosure as any information contained in an annual report or Form 10-K that is *not* recognized. Recognized amounts may have related disclosures on the face of the financial statements or in the notes, but the critical distinction in our study between *recognized* and *disclosed* is that recognized amounts are included in the totals of the financial statements.

Bernard and Schipper (1994) discuss different perspectives on the equivalence of disclosure and recognition and the role of accounting research in evaluating that equivalence. They suggest that the views of regulators and practitioners diverge on the distinction between recognition and disclosure. For example, they observe that a number of corporate managers submitted comments to the FASB indicating that the recognition of stock-based compensation as an expense would adversely affect their stock price and their ability to raise capital, but that footnote disclosure of this information would be acceptable. In contrast, regulators believe that the financial markets value substance over form so that information, whether recognized or disclosed, will be assigned its appropriate weight in determining values. Academics tend to share the regulator's view, and consequently, many research designs do not distinguish between recognized items and disclosed items. Consistent with the practitioner view, Bernard and Schipper (1994, 14) point out that recognition and disclosure could result in different stock price effects if (1) investors *inappropriately* undervalue disclosed amounts, or (2) recognition implies greater relevance or reliability.

Bernard and Schipper (1994) cite numerous studies that address how investors evaluate disclosures. Many prior studies indicate that disclosures related to unrealized gains/losses for banks, unrecognized pension or PRB liabilities, unrecognized changes in oil and gas reserves, and unrecognized R&D are at least partially valued by the stock market.[1] However, few studies examine whether disclosures are completely priced or equivalently priced to recognized amounts. Landsman and Ohlson (1990) suggest that the market underpriced pension disclosures, whereas Dhaliwal (1986) and Imhoff et al. (1993, 362) find that footnote information on pension and lease obligations is incorporated into market-risk assessments no differently than recognized debt. In an experimental setting, Harper et al. (1987, 329) find that subjects treat recognized pension obligations differently than disclosed unrecognized pension obligations. Bernard and Schipper (1994, 29) conclude that prior academic research is consistent with market participants pricing disclosures to some extent, but the research is inconclusive regarding the equivalence of disclosed and recognized amounts.

Bernard and Schipper (1994, 15) suggest that one reason for the dearth of studies testing the equivalence of recognition and disclosure is that such studies require a high level of precision in the face of several research design problems. They note that cross-sectional comparisons are difficult because accounting standards usually do not allow a choice between disclosure and recognition for the same economic situation. If there is such a choice, then firms self-select disclosure or recognition and controlling for the effect of such self-selection is problematic. Within-firm comparisons can also be problematic if estimates become more reliable and consequently move a firm from disclosure to recognition.

The discussion above indicates that the question of whether market participants view disclosed items and recognized items equivalently remains unanswered. In addition, the discussion indicates that it is difficult to find a setting where the question can be examined empirically. We believe that PRB liabilities provide a reasonable setting to address this research question because the SAB No. 74 disclosure requirements mitigate many of the design problems mentioned above.

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[1] These studies include Amir (1993), Barth (1991, 1994), Daley (1984), Hall (1993), Harris and Ohlson (1987), and Landsman (1986). See Bernard and Schipper (1994) for additional examples.

PRB Accounting

After discussing the appropriate accounting for PRB liabilities for several years, in November 1984 the FASB issued Statement of Financial Accounting Standards No. 81, *Disclosure of Postretirement Health Care and Life Insurance Benefits* (FASB 1984b), effective for fiscal years ending after December 15, 1984. The statement required footnote disclosure regarding the type of PRB, groups covered, accounting and funding policies, and cost recognized, which typically equaled the annual cash outlay (hereafter, "pay-as-you-go cost"). The FASB viewed the pronouncement as an interim measure while it studied measurement and recognition issues related to PRB liabilities (SFAS No. 81, para. 23). The FASB's expressed reason for requiring the PRB disclosure was the "lack of disclosures in employer's financial statements about those benefits, and the magnitude of the related costs" (SFAS No. 81, para. 3).

In December 1990 the FASB issued SFAS No. 106, requiring accrual accounting and disclosure for PRB similar to pension accounting under Statement of Financial Accounting Standards No. 87, *Employers' Accounting for Pensions* (FASB 1985). Whereas SFAS No. 87 *required* delayed recognition of the transition asset/liability, SFAS No. 106 allowed delayed recognition over 20 years *or* immediate recognition of the transition amount. Under delayed recognition, the PRB liability recognized on the balance sheet was significantly smaller than the PRB liability disclosed in the notes. Under immediate recognition, the recognized and disclosed PRB liabilities were approximately the same.[2]

Although SFAS No. 106 was passed in 1990, its adoption was not mandatory until fiscal years beginning after December 15, 1992. However, SAB No. 74 requires firms to discuss the expected impact of new accounting pronouncements before adoption in the Management Discussion and Analysis (MD&A) section of their 10-Ks. Very few liability or cumulative effect estimates were provided in 1990 financial statements, but most firms gave point or range estimates in 1991. Early adopters typically adopted the standard in the fourth quarter of the adoption year and retroactively applied the accounting change to the first quarter. On-time adopters (calendar year 1993 adopters) had to make the accounting change in the first quarter of 1993.

Prior Research About the Value Relevance of PRB Information

There has been a steady stream of research focusing on the relation between security prices and the PRB information that has been publicly available at different points in time (e.g., Espahbodi et al. 1991; Khurana and Loudder 1994; Amir 1993, 1996; Mittelstaedt and Warshawsky 1993; Choi et al. 1997). The existing research has focused on the value relevance of the PRB information independent of whether it was disclosed or recognized. Espahbodi et al. (1991) and Khurana and Loudder (1994) examined the price reaction of firms to deliberations surrounding SFAS No. 106, while Amir (1993) and Mittelstaedt and Warshawsky (1993) examined the value relevance of PRB liabilities estimated from the pay-as-you-go costs that were disclosed under SFAS No. 81. Choi et al.

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[2] Like SFAS No. 87, SFAS No. 106 required that a reconciliation of balance sheet amounts and PRB-funded status be shown in financial statement footnotes. In the first years that a firm was under SFAS No. 106, the reconciliation would have included a large reconciling item for a transition liability if delayed recognition were used. Firms using immediate recognition would not have had a reconciling item for the transition liability.

(1997) (hereafter CCJ) examined the value relevance and reliability of PRB liability information *disclosed* by management under SAB No. 74 (pre-SFAS No. 106) or recognized under SFAS No. 106. Thus, the results presented by CCJ assumes that the market viewed disclosed and recognized PRB liability information similarly. CCJ did not, however, specifically examine whether the disclosed SAB No. 74 PRB information was weighted differently by the market than was the recognized SFAS No. 106 PRB information. Finally, Amir (1996) investigates the value relevance of post-SFAS No. 106 information.

The primary message from the prior research is that PRB liability disclosures are value relevant, but probably less reliable than disclosures about pension liabilities. However, no study of which we are aware has used the particular history of required PRB disclosures to address the issue of whether the market changed its view of the PRB liability as the accounting changed from disclosure (under SAB No. 74) to recognition (under SFAS No. 106). Our study is intended to take advantage of this history.

III. RESEARCH DESIGN AND METHOD

When firms adopted SFAS No. 106 they had to elect immediate or delayed recognition of the PRB liability. Our research focuses on those firms that elected immediate recognition of the PRB liability and which made a disclosure of the PRB liability in the prior year because of the provisions of SAB No. 74. The objective of our analysis is to determine whether the market priced the recognized PRB liability differently than the previously disclosed PRB liability.

The disclosure of the expected impact of SFAS No. 106 prior to adoption allows us to address directly the research design concerns raised in Bernard and Schipper (1994) (discussed in Section II). First, our sample firms face the same economic situation, owing retiree benefits, both before and after adoption of SFAS No. 106. Second, use of disclosed liability amounts prior to SFAS No. 106 adoption and recognized liability amounts subsequent to adoption allows a within-firm design, thereby avoiding self-selection bias. Typically, studies that examine firms moving from disclosure to recognition suffer from endogeneity problems related to changes in managers' perceptions of reliability. However, the disclosure of the PRB liability is made in anticipation of the recognition required by the mandated change to SFAS No. 106. In this setting, it is less likely that managers would view the recognized number as more reliable. Both the disclosed and recognized items were measured in the same manner and were often the same in magnitude. Finally, both the disclosed and recognized liabilities represent estimates that are subject to measurement error. We mitigate the potential effects of measurement error in the disclosed items (and any of the other explanatory variables) by focusing on the difference between the coefficients of the disclosed and recognized items as opposed to their deviations from some theoretical value.

Empirical Models

To detect possible differences in the relation between market prices and recognized PRB liabilities vs. pre-adoption disclosed PRB liabilities, we modify the models used in CCJ (1997, 358) to allow for different coefficients in recognition and disclosure years. Our models are:

$$\begin{aligned} MVE_{it} = {} & \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_{3*}NPL_{it} + \gamma_5 PRB_{it} \\ & + \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_{8*}D * NPL_{it} + \gamma_{10} D * PRB_{it} + \varepsilon_{it} \quad (1) \end{aligned}$$

$$\begin{aligned} MVE_{it} = {} & \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_3 FVPA_{it} + \gamma_4 ABO_{it} + \gamma_5 PRB_{it} \\ & + \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_8 D * FVPA_{it} + \gamma_9 D * ABO_{it} \\ & + \gamma_{10} D * PRB_{it} + \varepsilon_{it} \end{aligned} \tag{2}$$

$$\begin{aligned} MVE_{it} = {} & \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_3 FVPA_{it} + \gamma_{4*} PBO_{it} + \gamma_5 PRB_{it} \\ & + \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_8 D * FVPA_{it} + \gamma_{9*} D * PBO_{it} \\ & + \gamma_{10} D * PRB_{it} + \varepsilon_{it} \end{aligned} \tag{3}$$

where MVE_{it} denotes the market value of equity of firm i at time t, BVA is the book value of total assets exclusive of recognized prepaid pension assets, BVL is the book value of total liabilities exclusive of recognized pension and PRB liabilities,[3] FVPA is the fair value of pension plan assets, ABO is the pension plan accumulated benefit obligation, PBO is the pension plan projected benefit obligation, NPL is the net pension liability (measured as FVPA less ABO),[4] and PRB is the recognized (post-SFAS No. 106 adoption) or disclosed (pre-SFAS No. 106 adoption) net PRB liability.[5]

Equation (1) nets pension assets and pension liabilities, whereas equations (2) and (3) allow pension plan assets and liabilities to enter the regression individually. Equations (2) and (3) are the same except that the pension liability is defined as ABO in equation (2) and PBO in equation (3). The advantage of equations (2) and (3) is that the coefficients on the pension variables are allowed to vary; the disadvantage is that FVPA, ABO, PBO, and PRB are typically highly correlated. Netting pension assets and pension liabilities (equation (1)) reduces the collinearity concerns but restricts the pension asset and pension liability coefficients to be the same. The trade-offs between equation (1) and equations (2) and (3) are discussed in more detail in section IV.

Variables with a "D" prefix have been added to the CCJ model and represent the original variables multiplied by a dummy variable, D, whose value is zero in the recognition/adoption year and 1 in the disclosure year.[6] The coefficients corresponding to the recognition year are γ_0 (intercept) and γ_1 through γ_5. The differences in intercept and slope between the recognition and disclosure years are represented by γ_{0*} and γ_6 through γ_{10}. The coefficient for the disclosure year equals the coefficient for the recognition year, plus the corresponding D coefficient. For example, the disclosure year coefficient for PRB is $\gamma_5 + \gamma_{10}$. Our main test focuses on whether γ_{10} is significantly negative. The negative expectation is based on the Bernard and Schipper (1994, 14) supposition that disclosed amounts may be viewed as less relevant or reliable. A significantly negative coefficient indicates that disclosed liabilities are priced less than recognized liabilities. The Ds for the intercept and other variables are included to ascertain whether other shifts are occurring during this period.[7]

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[3] For the SFAS No. 106 adoption year, the recognized PRB liabilities are subtracted from firm liabilities in arriving at BVL. Prior to SFAS No. 106 adoption, the PRB liabilities are disclosed but not recognized and therefore do not affect BVL.

[4] Using the projected benefit obligation to compute NPL yields similar results.

[5] Consistent with the amount recognized on the balance sheet under SFAS No. 106, we measure PRB liabilities net of any PRB plan assets. This is not an issue for most firms because most PRB plans do not have assets.

[6] See Kmenta (1986, 469–470) for a more detailed discussion of models that allow adjustments of intercepts and slopes.

With the exception of MVE, variables are measured as of the end of the year. We use a March 31 share price for MVE to ensure that investors are aware of the disclosed or recognized PRB liabilities. Most of the data are obtained from Compustat. However, the PRB amounts were hand-collected.[8] To control for size differences across firms, the variables in the regressions are estimated on a per-share basis.[9]

SFAS No. 106 was passed in 1990 but could have been adopted in fiscal years 1990 through 1993. Because our design requires disclosure of liabilities prior to recognition, our analysis is restricted to 1992 and 1993 adopters and uses data from 1991 through 1993.[10] For 1992 adopters, PRB liability disclosures are typically available only in 1991. However, disclosed liabilities for 1993 adopters are often available in both the 1991 and 1992 annual reports. Using 1992 disclosures for the 1993 adopters is consistent with using the one-year-ahead amounts for the 1992 adopters. However, because 1993 was the mandatory adoption year, 1992 annual reports became public about the same time that first quarter earnings with the SFAS No. 106 cumulative effect were being announced.[11] Consequently, treating the 1992 disclosures as disclosed rather than as recognized may be inappropriate. Using 1991 disclosures for 1993 adopters also poses problems in that the time between disclosure and recognition is longer, and 1991 disclosures are available for fewer firms (discussed below). To address this issue, we report separate results using both 1991 and 1992 PRB disclosures for 1993 adopters. In addition, because of the different reporting environments and potential differences between early adopters and on-time adopters (see Amir and Livnat 1996), we conduct separate analyses for the combined sample, 1992 adopters, and 1993 adopters.

Sample Selection

The sample consists of fiscal December 31 nonfinancial and nonutility firms that adopted SFAS No. 106 using immediate recognition in 1992 or 1993 and disclosing an estimate of the liability in a prior year or years. Given that two different years are included in the estimation, we restrict the firms to have the same fiscal year end in order to control for any other period-specific differences.

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[7] Whereas BVA and BVL are fully recognized on the balance sheet, NPL is typically only partially recognized because of the delayed recognition provisions in SFAS No. 87. Plan assets and various measures of plan liabilities are disclosed in footnotes with a reconciliation of funded status (plan assets less the projected benefit obligation) to the amount recognized on the balance sheet. Typical reconciling items are transition assets/liabilities, actuarial gains/losses, and unamortized benefits/costs from amendments. The minimum liability provisions of SFAS No. 87 require firms to recognize as a liability the difference between the accumulated benefit obligation (ABO) and plan assets when ABO exceeds plan assets. Consequently, most of the NPL for underfunded plans is on the balance sheet. During the time period studied, firms were generally overfunded and had substantial unamortized transition assets/liabilities, which resulted in most of NPL being off-balance sheet. We make no predictions about recognized and disclosed pension amounts vs. exclusively disclosed pension amounts, and therefore do not distinguish between them in our design.

[8] When ranges are reported, we use the midpoint of the range as in CCJ. Use of the maximum estimated liability instead of the midpoint yields similar results. We discuss ranges in more detail in Section IV.

[9] We also estimate the models in undeflated form. These results are discussed in more detail in Section IV.

[10] Only five of the 1991 adopters provided an estimate of the liability in 1990, therefore the current sample consists of only 1992 and 1993 adopters.

[11] For example, Chrysler released its annual report on March 29, 1993 and reported in a press release on April 5, 1993 that its first quarter earnings would include a cumulative effect for SFAS No. 106 of $4.7 billion. Chrysler filed its 1993 first-quarter report on May 14, 1993.

Consistent with Amir and Ziv (1997) and Khurana and Loudder (1994), we exclude financial institutions and utilities because additional accounting regulations in these industries may affect the relation between their stock prices and accounting variables. In addition, Amir and Livnat (1996) note that finance and utility firms tend to be late (1993) adopters and are more likely to use delayed recognition. They suggest that the large proportion of regulated firms among 1993 adopters may indicate that the adoption timing decision is influenced by industry regulation. Consequently, eliminating finance and utility firms makes the 1992 and 1993 samples more comparable.

A search of the Compustat Annual Industrial File identified 531 firms that adopted SFAS No. 106 in 1993 and 375 firms that adopted in 1992. We eliminate 272 (91) of the 1993 (1992) adopters that are in the utility or finance industries. We also discard 86 (42) of the 1993 (1992) adopters that do not have December 31 fiscal year ends. We next searched Laser Disclosure, Lexis/Nexis, or Corporate Text to determine whether firms disclosed estimates of their expected SFAS No. 106 liabilities in financial statements in the year prior to SFAS No. 106 adoption and whether they elected immediate recognition upon adoption of SFAS No. 106. We eliminate 27 (0) of the 1993 (1992) adopters because of delayed recognition and 63 (96) of the 1993 (1992) adopters because of missing financial statement or Compustat data needed to estimate equations (1) to (3).[12] These procedures resulted in a full sample of 229 firms (146 in 1992 and 83 in 1993). Using 1991 disclosures for 1993 adopters reduces the full sample by 30 firms, resulting in a reduced sample of 199 firms (53 in 1993).

Table 1 provides an industry distribution of the full sample. Most of the firms come from industries with two-digit SIC codes between 26 and 38 (81 percent of the sample). The highest percentages come from Chemical and Allied Products (SIC 28), Machinery excluding Electric (SIC 35), and Transportation Equipment (SIC 37).

IV. RESULTS

Descriptive Statistics and Correlation Analysis

Panel A of table 2 presents the values of the variables used in the analysis for the full sample. The left side gives the results for the disclosure year, and the right side gives the results for the recognition year. Liabilities appear as negative values in the table. The median MVE per share (total) is \$25.00 (\$1.51 billion) in the year of disclosure. The recognition years' MVE statistics are slightly larger than the pre-adoption amounts with a median market value of equity per share (total) of \$25.60 (\$1.55 billion). The median NPL per share (total) in the disclosure year is \$0.87 (\$37 million) and is \$0.55 (\$30 million) in the recognition year. The positive NPLs indicate that the pension plans are overfunded during the period studied. The median disclosed PRB liability per share (total) is \$−1.63 (\$−85 million) in the disclosure year and is \$−1.80 (\$−90 million) in the recognition year. Paired t-tests and Wilcoxon signed rank tests (not reported) indicate that the mean and median pre-SFAS No. 106 disclosed PRB liabilities are not significantly different than the post-SFAS No. 106 recognized PRB liabilities.[13]

Panels B and C present descriptive statistics separately for 1992 adopters and 1993 adopters. The results indicate that the 1993 adopters are generally smaller than the 1992

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[12] The elimination of more utility, finance, and delayed recognition firms for 1993 than for 1992 is consistent with Amir and Livnat (1996, 541–542). Based on their results, finding zero delayed recognition firms in 1992 is probably the result of our excluding utility and finance firms.

[13] Paired t-tests and Wilcoxon signed rank tests also indicate that recognized PRB liabilities are not significantly different than the PRB liabilities disclosed in the reconciliation at the end of the first year under SFAS No. 106. This finding is expected given that our sample includes only those firms that elected immediate recognition.

TABLE 1
Industry Distribution for Full Sample

SIC	*Industry Name*	*Total Firms*	*Percent*
10	Mining and Extractive Industries	4	1.7
12	Coal Mining	1	0.4
13	Oil and Gas Extraction	9	3.9
14	Nonmetal Mining	1	0.4
16	Nonbuilding Construction	2	0.9
20	Food and Kindred Products	13	5.7
21	Tobacco Products	2	0.9
22	Textile Mills Products	2	0.9
23	Apparel and Other Finished Products	1	0.4
26	Paper and Allied Products	18	7.9
27	Printing and Publishing	13	5.7
28	Chemical and Allied Products	32	14.0
29	Petroleum and Energy Products	13	5.7
30	Rubber and Plastic Products	4	1.7
32	Stone, Clay, and Glass Products	5	2.2
33	Metals	14	6.1
34	Fabricated Metal Products	16	7.0
35	Machinery excluding Electric	29	12.7
36	Electrical and Electronic Equipment	16	7.0
37	Transportation Equipment	19	8.3
38	Instruments and Related Products	7	3.0
50	Wholesale Trade—Durable Goods	2	0.9
51	Wholesale Trade—Nondurable Goods	2	0.9
53	General Merchandise	1	0.4
54	Food Stores	2	0.9
55	Automotive Dealers and Service Stations	1	0.4
TOTAL		229	100.0

adopters with median total market value in the disclosure year of $753 million vs. $1.88 billion for 1992 adopters. BVA and BVL also indicate differences in size. The panels also show that the financial statement impact of SFAS No. 106 was greater for 1992 adopters. The median recognized PRB liability for 1992 adopters is $$-$2.04 per share ($$-$156 million

TABLE 2
Descriptive Statistics[a]

	Year of Disclosure			Year of Recognition		
Variable	*Mean*	*Std. Dev.*	*Median*	*Mean*	*Std. Dev.*	*Median*
Panel A: Full Sample—1992 and 1993 Adopters with One-Year-Ahead Disclosures (n = 229)[b]						
MVE	$26.86	$15.17	$25.00	$28.15	$16.56	$25.60
	(4,741)	(9,099)	(1,514)	(4,991)	(9,649)	(1,546)
BVA	45.15	49.58	33.44	44.99	48.73	33.93
	(7,310)	(20,177)	(1,929)	(7,353)	(20,197)	(1,904)
BVL	−29.21	40.95	−17.71	−29.36	40.73	−19.92
	(−5,048)	(16,207)	(−1,173)	(−5,051)	(16,042)	(−1,194)
NPL	1.43	3.16	0.87	1.02	3.28	0.55
	(159)	(714)	(37)	(100)	(923)	(30)
FVPA	9.25	10.60	5.46	9.22	10.11	5.50
	(1,317)	(3,755)	(304)	(1,344)	(3,815)	(326)
ABO	−7.82	10.20	−4.19	−8.20	10.22	−4.27
	(−1,158)	(3,861)	(−224)	(−1,243)	(4,235)	(−242)
PBO	−8.98	11.08	−5.16	−9.34	11.03	−5.50
	(−1,328)	(4,169)	(−282)	(−1,417)	(4,540)	(−327)
PRB	−3.34	5.55	−1.63	−3.56	5.98	−1.80
	(−503)	(2,198)	(−85)	(−584)	(2,755)	(−90)
Panel B: 1992 Adopters with 1991 Disclosures (n = 146)						
MVE	$28.12	$15.37	$25.51	$29.98	$17.66	$26.25
	(6,163)	(10,815)	(1,877)	(6,536)	(11,502)	(2,203)
BVA	51.22	57.17	40.09	50.25	55.72	37.26
	(10,007)	(24,554)	(2,821)	(10,013)	(24,574)	(2,921)
BVL	−33.81	47.78	−22.31	−33.51	47.11	−23.15
	(−6,953)	(19,838)	(−1,715)	(−6,927)	(19,641)	(−1,780)
NPL	1.73	3.19	1.11	1.36	3.14	0.96
	(237)	(820)	(82)	(148)	(1,136)	(74)
FVPA	10.42	11.68	5.68	10.13	10.90	5.60
	(1,785)	(4,570)	(548)	(1,783)	(4,607)	(534)
ABO	−8.70	11.23	−4.77	−8.76	10.86	−4.94
	(−1,548)	(4,694)	(−435)	(−1,636)	(5,139)	(−436)
PBO	−9.99	12.29	−5.63	−10.02	11.84	−5.80
	(−1,776)	(5,065)	(−515)	(−1,868)	(5,509)	(−511)
PRB	−3.63	5.54	−1.82	−3.86	6.13	−2.04
	(−663)	(2,662)	(−143)	(−778)	(3,367)	(−156)

(Continued on next page)

TABLE 2 (Continued)

Variable	*Year of Disclosure*			*Year of Recognition*		
	Mean	*Std. Dev.*	*Median*	*Mean*	*Std. Dev.*	*Median*
	Panel C: 1993 Adopters with 1992 Disclosures (n = 83)					
MVE	$24.63 (2,239)	$14.64 (3,664)	$24.00 (753)	$24.91 (2,274)	$13.92 (3,632)	$25.25 (758)
BVA	34.48 (2,566)	29.57 (5,488)	25.36 (779)	35.75 (2,675)	31.27 (5,622)	26.36 (836)
BVL	−21.10 (−1,696)	22.81 (4,067)	−14.74 (−493)	−22.05 (−1,751)	24.55 (4,018)	−14.66 (−515)
NPL	0.90 (21)	3.07 (443)	0.34 (12)	0.41 (17)	3.46 (271)	0.14 (5)
FVPA	7.20 (492)	8.00 (1,095)	4.69 (138)	7.62 (570)	8.36 (1,408)	5.05 (150)
ABO	−6.29 (−471)	7.91 (1,318)	−3.43 (−112)	−7.21 (−553)	8.96 (1,557)	−3.89 (−129)
PBO	−7.20 (−540)	8.33 (1,403)	−4.15 (−131)	−8.14 (−623)	9.39 (1,628)	−4.58 (−148)
PRB	−2.83 (−222)	5.57 (882)	−1.14 (−38)	−3.02 (−242)	5.70 (936)	−1.33 (−38)

Variable Definitions:
MVE = March 31 market value of common equity (closing price) (#Q14 × #Q61);[c]
BVA = Book value of nonpension, non-PRB assets (#A6 − #A290);
BVL = Book value of nonpension, non-PRB liabilities (#A181 − #A300 − recognized PRB);
NPL = Net pension liability (FVPA + ABO);
FVPA = Fair value of pension plan assets (#A287 + #A296);
ABO = Accumulated benefit obligation for defined benefit pension plans (#A285 + #A293);
PBO = Projected benefit obligation for defined benefit pension plans (#A286 + #A294);
PRB = Accumulated postretirement benefit obligation other than pensions (disclosed prior to SFAS No. 106 and recognized subsequent to SFAS No. 106).

[a] The top numbers are measured on a per-share basis. Amounts in parentheses are totals in terms of millions of dollars. Subsequent tables are based on the per-share amounts. Negative amounts indicate liabilities or net liabilities.

[b] There are 229 firms in the full sample (146 in 1992, panel B, and 83 in 1993, panel C). The sample includes all firms that adopted SFAS No. 106 in 1992 or 1993 and disclosed an estimate of the PRB liability in the year prior to adoption. Only firms with 12/31 fiscal year ends for whom all of the necessary data are available are included in the sample.

[c] Compustat item numbers are indicated by a "#" followed by an "A" (annual) or "Q" (quarterly) and the Compustat item number. Per-share amounts are computed by dividing total amounts by #A25.

in total), whereas the median recognized PRB liability for 1993 adopters is S−1.33 per share ($−38 million in total).

The descriptive statistics for other partitions of the data (e.g., 1993 adopters with 1991 disclosures) do not reveal patterns in the data that are different than those in panels A, B, and C. Consequently, those statistics are not reproduced here.

Table 3 presents the Pearson and Spearman correlations for the full sample using per-share amounts; the correlations for the individual years, reduced sample, and total amounts

TABLE 3
Pearson and Spearman Correlations for Full Sample[a,b]

	MVE	*BVA*	*BVL*	*NPL*	*FVPA*	*ABO*	*PBO*	*PRB*
Panel A: Pre-SFAS No. 106 Adoption—Disclosure (1991 and 1992)								
MVE		0.42 (0.01)	−0.34 (0.01)	0.25 (0.01)	0.23 (0.01)	−0.16 (0.02)	−0.19 (0.01)	−0.06 (0.35)
BVA	0.43 (0.01)		−0.98 (0.01)	0.10 (0.12)	0.56 (0.01)	−0.55 (0.01)	−0.56 (0.01)	−0.44 (0.01)
BVL	−0.33 (0.01)	−0.96 (0.01)		−0.09 (0.20)	−0.50 (0.01)	0.50 (0.01)	0.51 (0.01)	0.40 (0.01)
NPL	0.28 (0.01)	0.35 (0.01)	−0.31 (0.01)		0.27 (0.01)	0.03 (0.67)	−0.03 (0.62)	0.21 (0.01)
FVPA	0.28 (0.01)	0.69 (0.01)	−0.65 (0.01)	0.59 (0.01)		−0.95 (0.01)	−0.97 (0.01)	−0.71 (0.01)
ABO	−0.24 (0.01)	−0.67 (0.01)	0.63 (0.01)	−0.45 (0.01)	−0.97 (0.01)		0.99 (0.01)	0.81 (0.01)
PBO	−0.28 (0.01)	−0.70 (0.01)	0.66 (0.01)	−0.48 (0.01)	−0.98 (0.01)	0.98 (0.01)		0.79 (0.01)
PRB	−0.21 (0.01)	−0.65 (0.01)	0.63 (0.01)	−0.26 (0.01)	−0.73 (0.01)	0.74 (0.01)	0.76 (0.01)	
Panel B: Post-SFAS No. 106 Adoption—Recognition (1992 and 1993)								
MVE		0.47 (0.01)	−0.39 (0.01)	0.24 (0.01)	0.25 (0.01)	−0.17 (0.01)	−0.21 (0.01)	−0.09 (0.16)
BVA	0.47 (0.01)		−0.98 (0.01)	−0.01 (0.88)	0.55 (0.01)	−0.55 (0.01)	−0.57 (0.01)	−0.46 (0.01)
BVL	−0.37 (0.01)	−0.96 (0.01)		0.02 (0.71)	−0.49 (0.01)	0.50 (0.01)	0.51 (0.01)	0.42 (0.01)
NPL	0.28 (0.01)	0.26 (0.01)	−0.21 (0.01)		0.13 (0.05)	0.19 (0.01)	0.14 (0.04)	0.35 (0.01)
FVPA	0.31 (0.01)	0.68 (0.01)	−0.64 (0.01)	0.45 (0.01)		−0.95 (0.01)	−0.96 (0.01)	−0.72 (0.01)
ABO	−0.27 (0.01)	−0.66 (0.01)	0.63 (0.01)	−0.30 (0.01)	−0.97 (0.01)		0.99 (0.01)	0.82 (0.01)
PBO	−0.30 (0.01)	−0.69 (0.01)	0.65 (0.01)	−0.33 (0.01)	−0.98 (0.01)	0.98 (0.01)		0.80 (0.01)
PRB	−0.26 (0.01)	−0.66 (0.01)	0.66 (0.01)	−0.15 (0.03)	−0.74 (0.01)	0.75 (0.01)	0.77 (0.01)	

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[a] Upper (Lower) Diagonal: Pearson (Spearman) Correlation Coefficients. Numbers in parentheses represent p-values, two-tailed tests.

[b] See Table 2 for the definition of variables. The correlations are based on per-share amounts.

are very similar to those reported here. The results for the pre-SFAS No. 106 adoption period (panel A) and post-SFAS No. 106 adoption period (panel B) are similar. MVE is significantly positively correlated with BVA, NPL, and FVPA. BVL, ABO, PBO, and PRB are negatively correlated with MVE, which on the surface is inconsistent with theory given that BVL, ABO, PBO, and PRB are negative. This result occurs because we have not controlled for the other variables, especially BVA, when measuring individual relations with MVE.

Both panels indicate that the correlation between BVA and BVL is very high with Pearson coefficients of –0.98. The correlations among FVPA, ABO, and PBO also are extremely high, with correlations in absolute terms ranging from 0.95 to 0.99. In addition, the Pearson correlations between PRB and these pension variables range from 0.71 to 0.82 in absolute terms. In contrast, the Pearson correlation between PRB and the net pension liability (NPL) is only 0.35 in the recognition year and 0.21 in the disclosure year. These correlations are discussed in more detail in conjunction with the regression results. Other correlations presented in the table are relatively low.

Regression Results

Table 4 presents the results of estimating Regressions (1) through (3) for the full sample, 1992 adopters, and 1993 adopters. The adjusted-R^2s range between 0.29 and 0.42. The intercept lies between 13 and 15, and the coefficients for BVA and BVL are highly significant and approximately 1.0 across all models. The pension coefficients are generally significant, less than 1.0 (except ABO in Regression 2), and vary in magnitude across specifications. These results are similar to the CCJ Table 3 results.

The recognition year PRB coefficients (γ_5s) are significant and range between 0.61 and 1.06 (except for 1993 adopters in Regression 2), which is higher than the range of 0.30 to 0.46 reported in CCJ. Based on Khurana and Loudder (1994), one potential reason for this difference is our exclusion of utility and finance firms. CCJ (1997, 362) report that 28 percent of their sample is in "transportation or public services" and that 14 percent of their sample is in "finance, insurance, or real estate." A second potential reason is that γ_5 is based on firms recognizing PRB liabilities, whereas the CCJ results include both disclosed and recognized PRB liabilities. This issue is discussed in more detail below. Similar to CCJ, the significance of the PRB coefficient is reduced when pension assets and liabilities are allowed to enter the regressions separately. For example, in the ABO model (Regression 2) for 1993 adopters, γ_5 is 0.38 and insignificant. In contrast, in the NPL model (Regression 1) for 1993 adopters, γ_5 is 0.76 and significantly different than zero.

The intercept and slope adjustment variables, indicated with a D prefix, extend the CCJ model to detect differences in the pricing of disclosed vs. recognized PRB liabilities. The pooled Regression 1 (NPL) model yields a γ_{10} of –0.38 and a disclosure year PRB coefficient ($\gamma_5 + \gamma_{10}$) of 0.60. The disclosure year PRB coefficient is significantly different than zero, and γ_{10} (the difference between the recognition year and disclosure year coefficient) is significant at a one-tailed level of 0.08. Except for the D*BVA coefficient, which is significant at a two-tailed 0.17 level, none of the other slope or intercept adjustment variables are near statistical significance.

The 1992 adopter results indicate a γ_{10} of –0.54, significant at a one-tailed level of 0.05. The disclosure year PRB coefficient ($\gamma_5 + \gamma_{10}$) of 0.52 is significantly different than zero and significantly smaller than the 1.06 γ_5 coefficient observed for the recognition year. These results suggest that there may have been a change in market perceptions as the 1992 adopters moved from disclosure to recognition. The results also show how combining disclosed and recognized PRB liabilities, as was done in CCJ, could result in lower coefficients.

TABLE 4
Regression Results for Full Sample[a]

Regression 1: $MVE_{it} = \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_{3*}NPL_{it} + \gamma_5 PRB_{it} + \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_{8*}D * NPL_{it} + \gamma_{10}D * PRB_{it} + \varepsilon_{it}$

Regression 2: $MVE_{it} = \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_3 FVPA_{it} + \gamma_4 ABO_{it} + \gamma_5 PRB_{it} + \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_8 D * FVPA_{it} + \gamma_9 D * ABO_{it} + \gamma_{10}D * PRB_{it} + \varepsilon_{it}$

Regression 3: $MVE_{it} = \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_3 FVPA_{it} + \gamma_{4*}PBO_{it} + \gamma_5 PRB_{it} + \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_8 D * FVPA_{it} + \gamma_{9*}D * PBO_{it} + \gamma_{10}D * PRB_{it} + \varepsilon_{it}$

		Regression 1 (t-statistic)			Regression 2 (t-statistic)			Regression 3 (t-statistic)		
Variable	*Coefficient*	*Pooled*	*1992 Adopters*	*1993 Adopters*	*Pooled*	*1992 Adopters*	*1993 Adopters*	*Pooled*	*1992 Adopters*	*1993 Adopters*
Intercept	γ_0	13.41 (9.53)	13.90 (7.49)	13.39 (5.86)	13.57 (9.67)	13.85 (7.46)	14.01 (6.19)	13.82 (9.71)	14.13 (7.56)	14.19 (6.08)
D	γ_{0*}	1.66 (0.84)	1.53 (0.58)	0.57 (0.18)	1.51 (0.77)	1.56 (0.59)	0.41 (0.13)	1.59 (0.80)	1.61 (0.61)	0.56 (0.17)
BVA	γ_1	0.99 (9.88)	1.03 (8.38)	0.89 (4.75)	1.05 (10.12)	1.07 (8.34)	0.96 (5.12)	1.06 (10.11)	1.08 (8.31)	1.00 (5.15)
BVL	γ_2	0.97 (8.33)	1.01 (7.11)	0.89 (3.90)	1.02 (8.60)	1.05 (7.17)	0.94 (4.21)	1.04 (8.61)	1.06 (7.17)	0.98 (4.24)
NPL	γ_{3*}	0.79 (2.91)	0.68 (1.90)	0.92 (2.01)	—	—	—	—	—	—
FVPA	γ_3	—	—	—	0.85 (3.12)	0.74 (2.04)	0.91 (2.04)	0.57 (1.86)	0.55 (1.40)	0.47 (0.88)
ABO	γ_4	—	—	—	1.16 (3.56)	0.98 (2.21)	1.31 (2.64)	—	—	—
PBO	γ_{4*}	—	—	—	—	—	—	0.69 (2.08)	0.61 (1.47)	0.70 (1.22)
PRB	γ_5	0.98 (5.08)	1.06 (4.62)	0.76 (2.02)	0.61 (2.34)	0.76 (2.17)	0.38 (0.89)	0.91 (3.67)	1.01 (3.20)	0.74 (1.69)

TABLE 4 (Continued)

		Regression 1 (t-statistic)			Regression 2 (t-statistic)			Regression 3 (t-statistic)		
Variable	*Coefficient*	*Pooled*	*1992 Adopters*	*1993 Adopters*	*Pooled*	*1992 Adopters*	*1993 Adopters*	*Pooled*	*1992 Adopters*	*1993 Adopters*
D*BVA	γ_6	−0.19 (−1.39)	−0.26 (−1.52)	0.02 (0.07)	−0.22 (−1.53)	−0.30 (−1.68)	0.10 (0.37)	−0.23 (−1.57)	−0.30 (−1.70)	0.06 (0.22)
D*BVL	γ_7	−0.17 (−1.06)	−0.24 (−1.20)	0.02 (0.06)	−0.19 (−1.18)	−0.27 (−1.35)	0.11 (0.34)	−0.21 (−1.23)	−0.28 (−1.37)	0.06 (0.17)
D*NPL	γ_{8*}	−0.11 (−0.30)	−0.06 (−0.01)	−0.31 (−0.47)	—	—	—	—	—	—
D*FVPA	γ_8	—	—	—	−0.12 (−0.30)	−0.06 (−0.12)	−0.20 (−0.31)	−0.11 (−0.25)	−0.08 (−0.14)	−0.05 (−0.07)
D*ABO	γ_9	—	—	—	−0.25 (−0.54)	−0.27 (−0.45)	0.02 (0.03)	—	—	—
D*PBO	γ_{9*}	—	—	—	—	—	—	−0.21 (−0.44)	−0.25 (−0.42)	0.16 (0.18)
D*PRB	γ_{10}	−0.38 (−1.44)	−0.54 (−1.70)	0.07 (0.15)	−0.24 (−0.66)	−0.28 (−0.54)	−0.05 (−0.08)	−0.30 (−0.85)	−0.31 (−0.66)	−0.18 (−0.30)
	$\gamma_5 + \gamma_{10}$	0.60 (3.42)	0.52 (2.45)	0.84 (2.42)	0.37 (1.44)	0.48 (1.34)	0.33 (0.84)	0.61 (2.46)	0.70 (2.07)	0.56 (1.36)
Number of Firm-Year Observations		458	292	166	458	292	166	458	292	166
Adjusted R^2		0.403	0.418	0.303	0.407	0.416	0.333	0.389	0.407	0.292

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[a] The coefficients for the original variables, (γ_1, γ_2, γ_3, γ_{3*}, γ_4, γ_{4*}, and γ_5) are expected to be positive since variables denoting liabilities are measured as negative amounts. One-tailed t-tests are used to assess the statistical significance of these coefficient estimates using critical values of $t_{\alpha=.10} = 1.28$, $t_{\alpha=.05} = 1.65$, and $t_{\alpha=.01} = 2.36$. Variables with a "D" prefix represent the original variables multiplied by a dummy variable, D, whose value is zero (1) for recognition (disclosure). The γ_{10} coefficient is expected to be negative so statistical significance is based on one-tailed tests. Two-tailed t-tests are used to assess the statistical significance of the other coefficients using critical values of $t_{\alpha=.10} = 1.65$, $t_{\alpha=.05} = 1.96$, and $t_{\alpha=.01} = 2.58$. All variables are measured on a per-share basis. There are 146 adopters in 1992 and 83 adopters in 1993. All variables are defined in Table 2.

The γ_{10} coefficient for 1993 adopters is clearly insignificant. The difference between the 1992 and the 1993 results may be due to the smaller sample size for the 1993 adopters, the lower PRB impact for the 1993 adopters (see Table 2), or from the near contemporaneous disclosure and recognition in the first quarter of 1993. The last possibility is discussed in more depth in conjunction with the reduced sample regression results.[14]

In Regressions 2 and 3, which allow pension plan assets and liabilities to have different coefficients, γ_{10} is insignificant for the full sample and the two subsamples. The lack of significance for the 1992 adopters may be influenced by the high collinearity among the pension and PRB variables. The standard errors for γ_5 and γ_{10} are higher in Regressions 2 and 3 than in the Regression 1 model. Moreover, there is a great deal of variability in the magnitude of the pension and PRB coefficients in the Regression 2 and 3 models, which is another symptom of collinearity (see Greene 1997, 420). CCJ (1997, 366, note 28) observe that the multicollinearity limits the power of tests and makes it more difficult to find significant differences between coefficients.[15] Landsman (1986, 684) states that in order to combine pension assets and pension liabilities into a single variable, the pension asset and pension liability coefficients should not be significantly different from one another. In untabulated results, we find that for 1992 adopters, γ_3, the coefficient for FVPA, is not significantly different from γ_4 or γ_{4*}, the coefficients on ABO and PBO, respectively. This finding suggests that Regression 1 results are more reliable than those in Regressions 2 and 3 because Regression 1 avoids some of the collinearity concerns associated with Regressions 2 and 3.

The results in Table 4 suggest that if any change in market perceptions occurred, the change was limited to 1992 adopters. However, because the recognition of the SFAS No. 106 liability in the first quarter of 1993 may have affected the market's assessment of 1992 annual report disclosures, we reestimate the pooled results using 1991 disclosures for both 1992 and 1993 adopters. The regression results for this reduced sample are presented in Table 5.[16]

The Table 5 Regression 1 results are similar to the Table 4 results, except that γ_6 (the BVA slope adjustment) is –0.24 (.09 two-tailed p-value) and γ_{10} (the PRB slope adjustment) is –0.61 (.01 one-tailed p-value). The γ_{10} result is consistent with the market pricing disclosed liabilities lower than recognized liabilities. We do not have an explanation for why balance sheet assets were valued differently in 1991.

Unlike Table 4, the Regression 2 (ABO model) γ_{10} coefficient is significantly negative at a one-tailed level of .10, and the Regression 3 (PBO model) γ_{10} coefficient is significantly negative at a one-tailed level of .03 level. As in Regression 1, the BVA slope adjustment coefficients are significantly different from zero at a .09 level. Despite the collinearity observed for the pension and PRB variables in Table 3, the ABO and PBO results are consistent with the NPL results.

The differences between Tables 4 and 5 do not appear to be the result of using a different sample. When we reestimate Regressions 1 to 3 using 1992 disclosures for the reduced sample 1993 adopters (as was done in Table 4), the results (not reported) are similar

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[14] Outliers do not appear to be causing the difference between 1992 and 1993. When influential observations are removed, the pooled and 1992 adopter γ_{10} coefficients are more significant, but the 1993 γ_{10} coefficient remains insignificant.

[15] Mason and Perreault (1991, 277) suggest that the presence of collinearity makes it even more difficult to find significant incremental explanatory power for individual coefficients when adjusted-R^2s are less than 0.50, as they are in our case.

[16] The 1992-adopter results are the same as those reported in Table 4; we do not report a separate regression for 1993-adopters because only 53 of these firms have 1991 disclosures.

TABLE 5
Regression Results for Reduced Sample[a]

Regression 1: $MVE_{it} = \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_{3*}NPL_{it} + \gamma_5 PRB_{it}$
$+ \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_{8*}D * NPL_{it} + \gamma_{10}D * PRB_{it} + \varepsilon_{it}$

Regression 2: $MVE_{it} = \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_3 FVPA_{it} + \gamma_4 ABO_{it} + \gamma_5 PRB_{it}$
$+ \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_8 D * FVPA_{it} + \gamma_9 D * ABO_{it}$
$+ \gamma_{10}D * PRB_{it} + \varepsilon_{it}$

Regression 3: $MVE_{it} = \gamma_0 + \gamma_{0*}D + \gamma_1 BVA_{it} + \gamma_2 BVL_{it} + \gamma_3 FVPA_{it} + \gamma_{4*}PBO_{it} + \gamma_5 PRB_{it}$
$+ \gamma_6 D * BVA_{it} + \gamma_7 D * BVL_{it} + \gamma_8 D * FVPA_{it} + \gamma_{9*}D * PBO_{it}$
$+ \gamma_{10}D * PRB_{it} + \varepsilon_{it}$

		Regression 1 (t-statistic)	*Regression 2 (t-statistic)*	*Regression 3 (t-statistic)*
Variable	*Coefficient*	*1992 and 1993 Adopters with 1991 Disclosures*	*1992 and 1993 Adopters with 1991 Disclosures*	*1992 and 1993 Adopters with 1991 Disclosures*
Intercept	γ_0	14.80 (9.71)	15.00 (9.89)	15.30 (9.94)
D	γ_{0*}	0.57 (0.27)	0.49 (0.23)	0.49 (0.23)
BVA	γ_1	0.93 (9.07)	0.98 (9.38)	1.00 (9.36)
BVL	γ_2	0.91 (7.64)	0.95 (7.94)	0.97 (7.95)
NPL	γ_{3*}	0.73 (2.70)	—	—
FVPA	γ_3	—	0.79 (2.93)	0.53 (1.74)
ABO	γ_4	—	1.11 (3.44)	—
PBO	γ_{4*}	—	—	0.67 (2.02)
PRB	γ_5	0.95 (4.94)	0.56 (2.14)	0.86 (3.46)
D*BVA	γ_6	−0.24 (−1.66)	−0.25 (−1.72)	−0.25 (−1.73)
D*BVL	γ_7	−0.22 (−1.35)	−0.24 (−1.44)	−0.24 (−1.45)
D*NPL	γ_{8*}	−0.14 (−0.36)	—	—
D*FVPA	γ_8	—	−0.14 (−0.36)	−0.06 (−0.13)
D*ABO	γ_9	—	−0.24 (−0.52)	—

(Continued on next page)

TABLE 5 (Continued)

Variable	Coefficient	*Regression 1 (t-statistic)*	*Regression 2 (t-statistic)*	*Regression 3 (t-statistic)*
		1992 and 1993 Adopters with 1991 Disclosures	*1992 and 1993 Adopters with 1991 Disclosures*	*1992 and 1993 Adopters with 1991 Disclosures*
D*PBO	γ_{9*}	—	—	−0.09 (−0.19)
D*PRB	γ_{10}	−0.61 (−2.60)	−0.41 (−1.31)	−0.58 (−1.95)
	$\gamma_5 + \gamma_{10}$	0.34 (2.64)	0.15 (0.93)	0.28 (1.76)
Number of Firm-Year Observations		398	398	398
Adjusted R^2		0.395	0.403	0.389

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[a] The coefficients for the original variables, (γ_1, γ_2, γ_3, γ_{3*}, γ_4, γ_{4*}, and γ_5) are expected to be positive since variables denoting liabilities are measured as negative amounts. One-tailed t-tests are used to assess the statistical significance of these coefficient estimates using critical values of $t_{\alpha=.10} = 1.28$, $t_{\alpha=.05} = 1.65$, and $t_{\alpha=.01} = 2.36$. Variables with a "D" prefix represent the original variables multiplied by a dummy variable, D, whose value is zero (one) for recognition (disclosure). The γ_{10} coefficient is expected to be negative so statistical significance is based on one-tailed tests. Two-tailed t-tests are used to assess the statistical significance of the other coefficients using critical values of $t_{\alpha=.10} = 1.65$, $t_{\alpha=.05} = 1.96$, and $t_{\alpha=.01} = 2.58$. All variables are measured on a per-share basis. There are 146 adopters in 1992 and 53 in 1993 that disclosed an estimated PRB liability in 1991. All variables are defined in Table 2.

to the pooled results reported in Table 4. This finding indicates that the differences in the Table 4 and Table 5 results are attributable to using 1991 disclosure information.

The results in Tables 4 and 5 provide some evidence that the market priced PRB liabilities disclosed in 1991 less than PRB liabilities recognized subsequently upon adoption of SFAS No. 106. This finding does not always hold in models that allow pension assets and pension liabilities to have different coefficients (see Table 4). Although it appears that the market priced disclosures made in 1992 by 1993 adopters in the same manner as amounts recognized under SFAS No. 106, this result may be due to the near contemporaneous disclosure and recognition of the PRB liability in the first quarter of 1993.

Additional Sensitivity Analysis

Following CCJ, this study uses the number of shares outstanding as the deflator. Barth and Kallapur (1996) show that deflation can result in spurious inferences. They suggest to (1) use undeflated models, (2) include a variable for size, and (3) base t-statistics on White's (1980) heteroscedasticity-consistent standard errors. Following their suggestions, we replicate the analyses reported in Tables 4 and 5 using undeflated variables, allowing the book values of assets and liabilities to act as size variables. We then compute t-statistics and related p-values using the White (1980) approach. In general, the pattern of results (not reported) is very similar to results reported in Tables 4 and 5. The main difference in Table 4 is that the γ_{10} (D*PRB) coefficient in the pooled NPL model (Regression 1) is significantly negative at the .01 level instead of the reported .08 level. The main differences in Table 5 are that the undeflated ABO (Regression 2) γ_{10} coefficient is significantly negative at a one-tailed level of .12 (instead of .10) and the undeflated PBO (Regression 3) γ_{10} coefficient is significantly negative at a one-tailed level of 0.10 (instead of .03).

A second issue relates to the effect of range disclosures on our results. Of the 229 firms used in Table 4, 93 firms (85 in 1992 and 8 in 1993) disclosed range estimates of their expected PRB liabilities and 136 firms (61 in 1992 and 75 in 1993) provided point estimates. To analyze the effect of ranges on our results, we include an additional dummy variable which allows the slope for γ_{10} (D*PRB) to be different for firms reporting ranges. Since only eight of the 1993 adopters report ranges in 1992, our Table 4 comparisons are restricted to 1992 adopters and the pooled sample. The coefficients for the range dummy variables are insignificant, which indicates that γ_{10} is not significantly different for firms disclosing ranges and firms disclosing point estimates. In Table 5, of the 53 1993 adopters with 1991 PRB disclosures, 37 made range estimates and 16 made point estimates. Repeating the approach described above, we find that the range dummy variable is clearly insignificant in all three models reported in Table 5. We also partition the sample according to whether firms gave point or range estimates and reconduct the Table 4 and Table 5 analyses. Again, the results for the partitioned samples are similar. This evidence suggests that range estimates are not solely responsible for the results reported in Tables 4 and 5.

V. SUMMARY AND CONCLUSIONS

This study investigates how well the market assessed firms' obligations for postretirement benefits other than pensions (PRB) before these liabilities were explicitly included in the body of the financial statements. Because of unique features associated with the adoption of SFAS No. 106, we are able to develop a research design to evaluate whether the market prices PRB liabilities *disclosed* prior to SFAS No. 106 adoption differently than PRB liabilities *recognized* subsequent to SFAS No. 106 adoption.

We find some evidence that the market priced the PRB liability differently before and after it was recognized under SFAS No. 106. The results indicate that both PRB liabilities *disclosed* prior to adoption of SFAS No. 106 and those *recognized* subsequent to adoption significantly contribute to explaining stock prices. However, results also suggest that 1991 PRB liability disclosures made prior to recognition have lower associations with stock prices than do recognized liabilities. The latter result does not always hold in models where pension assets and pension liabilities are included separately.

Some of the results are consistent with the FASB's contention that footnote disclosures are not adequate substitutes for recognized accounting information. These results also suggest that researchers may not be able to assume that recognized and disclosed amounts are priced by the market in the same manner. To further validate our results, future research should identify other contexts where the empirical problems mentioned in Bernard and Schipper (1994) can be addressed. Given that certain results depend on whether pension assets and liabilities are netted, future research should also address ways to evaluate appropriate model selection.

REFERENCES

Amir, E. 1993. The market valuation of accounting information: The case of postretirement benefits other than pensions. *The Accounting Review* 68 (October): 703–724.

———. 1996. The effect of accounting aggregation on the value-relevance of financial disclosures: The case of SFAS No. 106. *The Accounting Review* 71 (October): 573–590.

———, and J. Livnat. 1996. Multiperiod analysis of adoption motives: The case of SFAS No. 106. *The Accounting Review* 71 (October): 539–553.

———, and A. Ziv. 1997. Recognition, disclosure or delay: Timing the adoption of SFAS No. 106. *Journal of Accounting Research* 35 (Spring): 61–81.

Barth, M. 1991. Relative measurement errors among alternative pension asset and liability measures. *The Accounting Review* 66 (July): 433–463.

———. 1994. Fair value accounting: Evidence from investment securities and the market valuation of banks. *The Accounting Review* 69 (January): 1–25.

———, and S. Kallapur. 1996. The effects of cross-sectional scale differences on regression results in empirical accounting research. *Contemporary Accounting Research* 13 (Fall): 527–567.

Bernard, V., and K. Schipper. 1994. Recognition and disclosure in financial reporting. Working paper, University of Michigan and University of Chicago.

Choi, B., D. Collins, and W. Johnson. 1997. Valuation of reliability differences: The case of nonpension postretirement obligations. *The Accounting Review* 72 (July): 351–383.

Daley, L. 1984. The valuation of reported pension measures for firms sponsoring defined benefit plans. *The Accounting Review* 59 (April): 177–198.

Dhaliwal, D. 1986. Measurement of financial leverage in the presence of unfunded pension obligations. *The Accounting Review* 61 (October): 651–661.

Espahbodi, H., E. Strock, and H. Tehranian. 1991. Impact on equity prices of pronouncements related to nonpension postretirement benefits. *Journal of Accounting and Economics* 14 (December): 323–346.

Financial Accounting Standards Board (FASB). 1984a. *Recognition and Measurement in Financial Statements of Business Enterprises*. Statement of Financial Accounting Concepts No. 5. Stamford, CT: FASB.

———. 1984b. *Disclosure of Postretirement Health Care and Life Insurance Benefits*. Statement of Financial Accounting Standards No. 81. Stamford, CT: FASB.

———. 1985. *Employers' Accounting for Pensions*. Statement of Financial Accounting Standards No. 87. Stamford, CT: FASB.

———. 1990. *Employers' accounting for postretirement benefits other than pensions*. Statement of Financial Accounting Standards No. 106. Norwalk, CT: FASB.

Greene, W. 1997. *Econometric Analysis*. 3rd edition. Upper Saddle River, NJ: Prentice Hall, Inc.

Hall, B. 1993. The stock market valuation of research and development during the 1980s. *American Economic Review* 83 (May): 259–264.

Harper, R., Jr., W. Mister, and J. Strawser. 1987. The impact of new pension disclosure rules on perceptions of debt. *Journal of Accounting Research* 14 (Autumn): 327–330.

Harris, T., and J. Ohlson. 1987. Accounting disclosure and the market's valuation of oil and gas properties. *The Accounting Review* 62 (October): 651–670.

Imhoff, E., R. Lipe, and D. Wright. 1993. The effects of recognition vs. disclosure on shareholder risk and executive compensation. *Journal of Accounting, Auditing and Finance* 8 (Fall): 335–368.

Khurana, I., and M. Loudder. 1994. The economic consequences of SFAS 106 in rate-regulated enterprises. *The Accounting Review* 69 (April): 364–380.

Kmenta, J. 1986. *Elements of Econometrics*. 2nd edition. New York, NY: Macmillan Publishing Company.

Landsman, W. 1986. An empirical investigation of pension fund property rights. *The Accounting Review* 61 (October): 662–691.

———, and J. Ohlson. 1990. Evaluation of market efficiency for supplementary accounting disclosures: The case of pension assets and liabilities. *Contemporary Accounting Research* 7 (Fall): 185–198.

Mason, C., and W. Perreault, Jr. 1991. Collinearity, power, and interpretation of multiple regression analysis. *Journal of Marketing Research* 28 (August): 268–280.

Mittelstaedt, H. F., and M. Warshawsky. 1993. The impact of liabilities for retiree health benefits on share prices. *The Journal of Risk and Insurance* 60 (March): 13–35.

Securities and Exchange Commission (SEC). 1987. *Disclosure Regarding Accounting Standards Issued but Not Yet Adopted.* Staff Accounting Bulletin No. 74. Washington, D.C.: SEC.

White, H. 1980. A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica* 48 (May): 817–838.

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Incentives and Penalties Related to Earnings Overstatements that Violate GAAP

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ABSTRACT: This paper investigates the incentives and the penalties related to earnings overstatements primarily in firms that are subject to accounting enforcement actions by the Securities and Exchange Commission (SEC). I find (1) that managers in treatment firms are more likely to sell their holdings and exercise stock appreciation rights in the period when earnings are overstated than are managers in control firms, and (2) that the sales occur at inflated prices. I do not find evidence that earnings overstatement in these firms is motivated by concerns about debt covenant violations or the cost of external financing. The evidence suggests that the monitoring of managers' trading behavior can be informative about the likelihood of earnings overstatement.

Many economists believe that insider trading is an efficient method of compensating managers for their efforts. These economists argue that reputation losses would preclude managers from making profitable trades before periods of poor corporate performance. Consequently, this paper also investigates the employment and monetary penalties imposed on managers after the earnings overstatement is publicly discovered. This evidence reveals that (1) managers' employment losses subsequent to discovery are similar in firms that do and do not overstate earnings and (2) that the SEC is not likely to impose trading sanctions on managers in firms with earnings overstatement unless the managers sell their own shares as part of a firm security offering. The evidence suggests that neither employment or SEC-imposed monetary losses are effective in preventing the managers in these firms with extreme earnings overstatements from selling their stake in their firms in the face of declining performance.

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Data Availability: *Data are commercially available from sources identified in the text.*

I. INTRODUCTION

This paper presents evidence about the incentives for earnings overstatement in firms primarily subject to accounting enforcement actions by the Securities and Exchange Commission (SEC) and evidence about the penalties imposed on the managers of such firms. In a prior paper, Dechow et al. (1996) (hereafter DSS) conduct a broad-based investigation of firms subject to accounting enforcement actions by the SEC. One aspect of their investigation was to provide evidence about the incentives of the managers of these firms to overstate earnings. They conclude "that important motivations for earnings manipulation are the desire to raise external financing at low cost and to avoid debt covenant restrictions. We do not, however, find systematic evidence that managers are manipulating earnings to obtain a larger earnings-based bonus, nor do managers appear to be manipulating in order to sell their stockholdings at inflated prices" (DSS 1996, 30). This conclusion suggests that managers' earnings overstatements are intended to produce benefits for their firms. Accordingly, DSS (1996, 30) suggest "that manipulating earnings initially enables the firm to enjoy lower costs of capital, but that once earnings manipulation is revealed, the firms experience significant increases in their costs of capital." One implication of this aspect of the DSS results is that the monitoring of insider transactions would not provide relevant signals about the existence of earnings manipulation.

In this paper, I also present evidence about incentives for earnings manipulation. The difference between my analysis and that of DSS is that I explicitly consider whether managers overstate earnings to sell their equity contingent wealth at inflated prices. That is, (1) I use measures of insider equity dispositions during the earnings manipulation period that differ from DSS, (2) I monitor the managers' exercise of stock appreciation rights during the earnings manipulation period which is not part of the DSS study, and (3) I investigate whether prices are inflated in the manipulation period by analyzing the stock market and litigation effects of the earnings overstatement.

My evidence is not consistent with the DSS conclusion that earnings manipulation is intended to obtain external financing at lower cost. Rather, I find that managers of firms with earnings overstatements that violate GAAP are more likely to sell their holdings and to redeem stock appreciation rights during the period when earnings are overstated than are managers in a control sample of firms. I also find an average stock price loss of 20 percent when the overstatement is discovered and an average cost of settling litigation that is 9 percent of market value prior to discovery. This suggests that managers' stock transactions during the period of earnings overstatement occur at inflated prices that reflect the effect of the earnings overstatement.[1]

Interpreting these findings is difficult because they are based on a sample consisting primarily of firms for which earnings overstatement was sufficiently extreme to merit regulatory action. That is, since sample firms are primarily identified as a result of a decision by managers to overstate earnings and a decision by the SEC to investigate and charge firms, the observed results could reflect not only managers' trading incentives, but also the SEC investigation process. This study seeks to reduce this source of ambiguity by selecting control firms that are likely to be closely scrutinized by the SEC, and by controlling for factors that are expected to influence the SEC decision to investigate and charge firms.

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[1] Assuming that investors have unbiased expectations about the cost of settling subsequent litigation, the evidence suggests that discovery announcements lead to significant revisions about firm value independently of changes in expected litigation costs. A detailed analysis of the stock market reaction and of the costs of settling litigation appears later in the paper.

Subject to the caveat previously described, the results on insider trading and stock appreciation rights suggest managers' desire to sell their equity contingent wealth at higher prices as a motivation for earnings overstatement. I attribute the difference between my findings and those of DSS to the use of constructs that increase the likelihood of detecting an effect. My findings are also consistent with recent research suggesting that managers reduce their stake in the firm's equity after perpetrating fraud (Summers and Sweeney 1998) and in the years preceding bankruptcy filings (Seyhun and Bradley 1997).[2] They are also consistent with professional views of the causes of earnings manipulation (National Association of Certified Fraud Examiners 1993). The accumulation of evidence in Seyhun and Bradley (1997), Summers and Sweeney (1998) and in this paper suggests that monitoring managers' trading behavior can be informative about the likelihood of earnings overstatement.

This paper also provides evidence about the penalties imposed on the managers in firms with earnings overstatements that violate GAAP. This evidence is relevant to the long-standing policy debate about the prohibition of informed insider trading (Arshadi and Eyssell 1993; Dalley 1998). Rules that prohibit informed insider trading are based on notions of equity rather than efficiency. Economists have long regarded insider trading as an efficient means of compensating managers.[3] Proponents of insider trading argue that nontrade incentives such as compensation from continued and future employment prevent insiders from profiting from corporate failure. To shed light on these arguments, I present evidence about managerial employment losses subsequent to discovery and the incidence of monetary sanctions imposed by the SEC on the perpetrating managers. I find that managers' employment losses subsequent to discovery are similar in firms that overstate earnings and in firms that do not. I also find that the SEC tends not to impose monetary sanctions on the managers it charges with earnings overstatement and who profit from transactions in their own equity, unless the overstatement occurs in the context of a security offering. My results suggest that the nontrade incentives that the proponents of insider trading claim will inhibit insiders from taking advantage of outsiders during periods of declining performance do not appear to be strong or effective for the cases of extreme earnings manipulation examined in this paper.

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[2] Summers and Sweeney (1998) examine insider trading in firms involved in illegal acts. Communication with the authors indicated that influence peddling and bid rigging with respect to government and defense contracts were common frauds in their sample. The samples in our studies thus differ in concept. They also differ in actuality since the intersection between my sample of 64 firms and Summers and Sweeney's (1998) sample of 51 firms consists of one firm. In addition, because the time periods spanned by both samples differ, I also compute the intersection of their sample and all firms subject to SEC accounting enforcement actions using the firms reported in Feroz et al. (1991, 127–140) for Accounting and Enforcement Releases not covered in my sample period and find that the cardinality of the intersection set is three firms.

[3] In his classic work, Manne (1966, 138) argues that insider trading can improve the alignment of interest between shareholders and managers by allowing the latter to profit from the appreciation in value resulting from their efforts. More recently, Carlton and Fischel (1983, 867) argue that insider trading resolves an adverse selection problem because high-quality managers signal their ability by accepting contracts that provide compensation via insider trading. Dye (1984) shows that shareholders are better off allowing managers to trade relative to compensating managers with an earnings-contingent contract. Noe (1997) shows, in a model where investors can contract to prohibit insider trading, that investors permit insider trading as a substitute for more costly effort assuring compensation packages.

The remainder of this paper is organized as follows. Section II describes the sample of firms subject to SEC accounting enforcement actions (the treatment group) and the firms that are used as a control group in both the examination of the incentives for extreme earnings overstatement and in the examination of the penalties for such overstatement. Section III provides the evidence related to the incentives for managers to undertake the extreme forms of earnings overstatement that make them subject to SEC accounting enforcement actions, while section IV provides the evidence related to the penalties imposed on the managers in the treatment firms relative to the firms in the control group. Section V provides concluding remarks.

II. SAMPLE SELECTION CRITERIA AND RESEARCH DESIGN

Selecting the Treatment Sample

The sample consists of the 64 firms identified by Beneish (1997). Beneish (1997) identifies firms using both SEC and news media releases in the period 1987–1993 (a full description is in Table 1, note c). The SEC search is based on Accounting and Auditing Enforcement Releases (AAERs) which contain the details of the SEC's enforcement actions against firms it alleged to have violated the financial reporting requirements of the Security Exchange Act of 1934. Beneish (1997) conducts a news media search to complement the SEC search since, according to Feroz et al. (1991), over a third of the SEC enforcement actions are initiated from scanning the financial press and there is a lag of two to four years between the occurrence of violation and the SEC enforcement action.[4]

Forty of the 64 sample firms are common to both searches, 14 appear only in the SEC search and ten appear only in the news media search. I label treatment firms "GAAP violators" because they represent known, as opposed to presumed, earnings manipulators. Since the sample of GAAP violators consists primarily of firms subject to SEC enforcement actions, it is similar to DSS's sample. Comparing the size—total assets in the year prior to violation—of firms in my sample to that of DSS yields the following. The mean firm size (standard deviation) is larger in DSS's sample $2285.53 (7089.29) million than in my sample $334.81 (1368.16) million; however, the medians are numerically close $39.83 in DSS (1996, 17, Table 6) vs. $31.19 million in this study (see Table 1). It is possible the average difference occurs because, unlike DSS, my sample excludes financial institutions and utilities—firms likely to have large asset bases. My sample excludes such firms because I seek to increase the likelihood that sample firms are homogenous with respect to incentives to alter earnings.[5]

Selecting Control Samples

My analysis uses two control samples. First, to enable a comparison to DSS, I select a control sample that matches on two-digit industry, year, and total assets as a proxy for size. Second, I select a control sample that matches on two-digit industry, year, and time-listed (a proxy for age). Firm age is justified as a matching variable because the SEC decision to investigate firms is based on their age. The SEC closely scrutinizes young growth firms as it perceives such firms to have higher likelihoods of financial statement fraud and financial distress (Feroz et al. 1991; Beneish 1997).[6] For example, with written approval from the SEC's chief accountant, Beneish (1997, 283) reports a conversation with Mr. George H. Diacont as follows:

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[4] I confirmed in a phone conversation with George H. Diacont, Chief Accountant, Division of Enforcement, Office of Corporate Practice at the SEC that the SEC systematically reviews media stories of criticized financial reporting. Indeed, some of the SEC enforcement actions issued in 1987–1990 relate to reporting violations that occurred in years 1983 to 1986. More important, I find that five of the 15 media-identified firms are charged by the SEC outside of the sample period. This suggests that failing to conduct the media search would result in ignoring a substantial portion of GAAP violators in the population.

[5] For example, studies of regulated financial institutions indicate that managers face multiple incentives to manage earnings. In particular, these studies suggest that incentives associated with regulatory capital and decreasing taxes balance those associated with increasing earnings. Indeed, these studies generally provide evidence consistent with smoothing (see Moyer 1990; Scholes et al. 1990; Beatty et al. 1995; Collins et al. 1995). While DSS identify 77 nonfinancial/utility firms (or 13 more than the sample in this paper), they examine AAERs issued from 1982 to 1992, whereas I study the period 1987–1993.

> According to the Chief Accountant of the SEC's enforcement program many of the leads for accounting enforcement come from the Division of Corporation Finance's review of security filings. In the Chief Accountant's experience, many of the companies that end up becoming the subject of an enforcement action do so in the context of an initial public offering or as a result of financial statement manipulations shortly after initial public offerings.

Indeed, the SEC conducts full reviews of nearly all first-time registrations, and tends to perform full reviews of subsequent registrations by recently listed firms.[7] Since treatment firms are identified as a result of the decision by managers to overstate earnings and the decision by the SEC to investigate and charge firms for overstating earnings, the second control sample reduces the likelihood that observed differences between treatment and control firms relate to the SEC investigation process.[8] While the sample is matched on age rather than growth, it is likely that recently listed firms are also growth firms, given evidence that firms time security issuances to coincide with periods of unusually good performance (e.g., Loughran and Ritter 1997). Indeed, as shown in Table 1, matching on age has the advantage of yielding a sample that is not distinguishable from the treatment sample in terms of growth.

Comparing Treatment and Control Samples

Table 1, panel A reports the results of a comparison of GAAP violators to size-matched controls in the year *prior* to GAAP violation.[9] The comparison indicates that the samples

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[6] Evidence in prior research consistent with the SEC's perception is as follows: (1) young growth firms are more likely to commit financial statement fraud because their financial position and capital needs put pressure on managers to achieve earnings targets and maintain the appearance of growth (National Commission on Fraudulent Financial Reporting 1987; Loebbecke et al. 1989; Fridson 1991; Beasley 1996); (2) they also tend to have weaker governance structures and internal controls lag behind operations in periods of high growth (Loebbecke et al. 1989; Beasley 1996); (3) they tend to have poorer information environments (Barry and Brown 1984), and are at greater risk of distress (Dopuch et al. 1987; Feroz et al. 1991).

[7] Regarding the level of scrutiny, Pincus et al. (1988, 45) state: "In 1985, of the 71,663 filings received by the SEC, 9,382 (13.1 percent) were fully reviewed. The level of review depends on the perceived risk of the filing. For example, 97.5 percent of 1985 first-time registration statements were fully reviewed, vs. 33.2 percent of the repeat registrations."

[8] If the determinants of the SEC's scrutiny are similar in treatment and control samples, an empirical model of the incentives for earnings manipulation estimated with such firms is less susceptible to biases due to correlated omitted variables. That is, a "true" model of the determinants of earnings manipulation includes variables that also influence the SEC's decision to investigate a firm, and variables unique to the earnings manipulation decision. Thus, failing to account for determinants of the SEC decision in a model seeking to investigate the determinants of earnings overstatement increases the likelihood of biased coefficients due to correlated omitted variables.

[9] As depicted in Figure 1, for GAAP violators, the year prior is the fiscal year immediately preceding the first fiscal year in which either the SEC alleges that the firm started violating GAAP or media accounts indicate that GAAP violation occurred.

TABLE 1
Selected Financial Characteristics of Sample Firms One Year Prior to GAAP Violation Compared to (1) Industry, Year, and Size-Matched Controls[a] and (2) Industry, Year, and Age-Matched Controls[a]

	GAAP Violators (n = 64)[c]				*Size-Matched Firms (n = 64)*			
Financial Characteristics[b]	*Mean (std.dev)*	*Lower Quartile*	*Median*	*Upper Quartile*	*Mean (std.dev)*	*Lower Quartile*	*Median (p-Value χ^2)*	*Upper Quartile*
Panel A: GAAP Violators and Size-Matched Firms								
Total Assets (millions)	334.81 (1368.16)	8.33	31.19	81.38	120.90 (338.32)	8.07	26.91 (.72)	62.14
Working Capital to Total Assets	.262 (.471)	.119	.272	.493	.289 (.242)	.186	.343 (.48)	.470
Total Debt to Total Assets	.606 (.442)	.321	.560	.726	.549 (.247)	.357	.521 (.29)	.654
Profit Margin	−.103 (.493)	.011	.040	.092	−.043 (.232)	−.026	.009 (.015)	.046
ROA	−.004 (.239)	.013	.051	.100	−.025 (.190)	−.045	.013 (.01)	.068
Cash Flow to Total Assets	−.121 (.710)	−.052	.044	.163	.009 (.392)	−.020	.045 (.93)	.110
Total Accruals to Total Assets	.249 (.403)	.023	.129	.408	−.028 (.324)	−.176	−.048 (.01)	.167
Discretionary Accruals[d]	.545 (1.828)	−.145	.084	.609	.013 (.413)	−.214	−.047 (.01)	.195
Sales Growth	.960 (1.228)	.052	.220	.876	.183 (.386)	−.019	.105 (.04)	.286
Cash Sales Growth	1.298 (4.133)	.001	.203	.672	.305 (.357)	−.029	.063 (.02)	.262
Time Listed (months)	44.45 (63.19)	11.00	19.00	48.00	111.76 (98.83)	32.50	97.5 (.01)	192.00

TABLE 1 (Continued)

	GAAP Violators (n = 64)[c]				Size-Matched Firms (n = 64)			
Financial Characteristics[b]	*Mean (std.dev)*	*Lower Quartile*	*Median*	*Upper Quartile*	*Mean (std.dev)*	*Lower Quartile*	*Median (p-Value χ^2)*	*Upper Quartile*
Percentage Shares held by Insiders (%)[e]	33.00 (20.27)	17.24	29.70	44.33	27.61 (24.72)	10.49	20.90 (.04)	53.56
Number of Shareholders (thousands)[e]	.866 (2.124)	.583	.803	10.246	.687 (.115)	.614	.688 (.46)	.759
Panel B: GAAP Violators and Age-Matched Firms								
Total Assets (millions)	334.81 (1368.16)	8.33	31.19	81.38	428.43 (1735.98)	10.52	40.32 (.12)	185.53
Working Capital to Total Assets	.262 (.471)	.119	.272	.493	.235 (.268)	.091	.260 (.94)	.411
Total Debt to Total Assets	.606 (.442)	.321	.560	.726	.527 (.219)	.357	.524 (.11)	.624
Profit Margin	−.103 (.493)	.011	.040	.092	−.063 (.334)	.002	.029 (.12)	.053
ROA	−.004 (.239)	.013	.051	.100	.008 (.165)	.007	.047 (.79)	.085
Cash Flow to Total Assets	−.121 (.710)	−.052	.044	.163	−.031 (.567)	.002	.054 (.71)	.110
Total Accruals to Total Assets	.249 (.403)	.023	.129	.408	.035 (.319)	−.070	.069 (.07)	.186
Discretionary Accruals[d]	.545 (1.828)	−.145	.084	.609	.040 (.485)	−.206	−.015 (.04)	.231
Sales Growth	.960 (1.228)	.052	.220	.876	.467 (.412)	.098	.227 (.70)	.362

(Continued on next page)

TABLE 1 (Continued)

	GAAP Violators ($n = 64$)[c]				Size-Matched Firms ($n = 64$)			
Financial Characteristics[b]	*Mean (std.dev)*	*Lower Quartile*	*Median*	*Upper Quartile*	*Mean (std.dev)*	*Lower Quartile*	*Median (p-Value χ^2)*	*Upper Quartile*
Cash Sales Growth	1.298 (4.133)	.001	.203	.672	.507 (.636)	.001	.136 (.67)	.296
Time Listed (months)	44.45 (63.19)	11.00	19.00	48.00	59.80 (79.35)	11.00	35.00 (.54)	66.00
Percentage Shares held by Insiders (%)[e]	33.00 (20.27)	17.24	29.70	44.33	30.62 (24.10)	8.55	24.57 (.43)	48.76
Number of Shareholders (thousands)[e]	.866 (2.124)	.583	.803	10.246	.708 (1.726)	.595	.689 (.54)	.782

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[a] The control samples consist of firms matched on (1) industry (two-digit SIC), time period and size, and (2) industry (two-digit SIC), time period and age. That is, for each GAAP violator, I select as a control the firm in the same two-digit industry and year that is closest in total assets (first control sample) and time listed (defined in note b below) in the second control sample. For GAAP violators, the year prior is the fiscal year immediately preceding the first fiscal year for which either the SEC charges the firm with violating GAAP or media accounts indicate that GAAP violation occurred. For the control sample, the year prior is the fiscal year preceding the match year.

[b] Variable definitions (subscript t refers to the year of GAAP violation or selection)

Total Assets = Compustat item #6 at t − 1

Working Capital/Total Assets = [Current asset$_{t-1}$ (#4) − Current liabilities$_{t-1}$ (#5)]/Total assets$_{t-1}$

Total Debt$_{t-1}$/Total Assets$_{t-1}$ = [Current liabilities$_{t-1}$ (#5) + Long Term Debt$_{t-1}$ (#9)]/Total assets$_{t-1}$

Profit Margin$_{t-1}$ = Income before Extraordinary Items$_{t-1}$ (#18)/Sales$_{t-1}$ (#12)

ROA$_{t-1}$ = Income before Extraordinary Items$_{t-1}$ (#18)/Total Assets$_{t-1}$ (#6)

Cash Flow/Total Assets = Cash Flow from Operations$_{t-1}$ (#308)/Total Assets$_{t-1}$ (after 1987) or = [Income before Extraordinary Items$_{t-1}$ (#18) − Total Accruals$_{t-1}$ (note f)]/Total Assets$_{t-1}$

Total Accruals/Total Assets = Total Accruals$_{t-1}$ (note f)/Total Assets$_{t-2}$

Cash Sales$_{t-1}$ = [Sales$_{t-1}$ − (Receivables$_{t-1}$ (#2) − Receivables$_{t-2}$)]

Cash Sales Growth$_{t-1}$ = (Cash Sales$_{t-1}$ − Cash Sales$_{t-2}$)/Cash Sales$_{t-2}$

Sales Growth$_{t-1}$ = (Sales$_{t-1}$ − Sales$_{t-2}$)/Sales$_{t-2}$

Time Listed = distance in months between the fiscal year end at t − 1 and the earliest listing date in the CRSP Daily Master or OTC tapes (BEGDAT)

Percentage Shares Held by Insiders = Number of shares held by insiders to total shares outstanding in year t (Source: Compact Disclosure 1987–1993). Disclosure defines insiders as officers, directors, beneficial owners, and principal stockholders owning ten percent or more of the company stock.

Number of Shareholders = Number of shareholders at the end of fiscal year t (Source: Compact Disclosure 1987–1993)

TABLE 1 (Continued)

[c] Following Feroz et al. (1991), I examine Accounting and Auditing Enforcement Releases #132 to #502 from 1987 to 1993 to identify firms subject to accounting enforcement by the SEC. The number of AAERs examined is 363 instead of 371 because AAER numbers 372 to 379 were not used (see *Federal Securities Law Reporter*). The news media search on Lexis/Nexis encompassed the following databases (from January 1987 to April 1993): *Barron's, Business Week, Business Wire, Corporate Cash Flow, Disclosure Online, Fortune, Institutional Investor, Investor Daily, Money, The Courier Journal, The New York Times, The Wall Street Journal, The Washington Post,* and *The Reuter Business Report*. The search was conducted using the following key words and their variants "earnings management," "earnings manipulation," "cooking the books," "financial statements or reports," with adjectives such as deceptive, false, fraudulent, misleading, illusive, inappropriate, misstated, and spurious; "inflated or overstated" with either profits, earnings or income.

[d] The Modified Jones model (Dechow et al. 1995) is estimated in cross section for all firms in the same two-digit SIC code for which the data below are available on Compustat. The model parameters estimates in a given year (t) are used to forecast "nondiscretionary" accruals for the following year (t + 1). The difference between total accruals in year t + 1 and the "nondiscretionary" accruals forecast at t + 1 is the estimated discretionary accrual. The model is estimated as follows:

$$\frac{\text{Total Accruals}_{ijt}}{A_{ijt-1}} = \alpha_{jt}\frac{1}{A_{ijt-1}} + \beta_{1jt}\frac{PPE_{ijt}}{A_{ijt-1}} + \beta_{2jt}\frac{\Delta ADJREV_{ijt}}{A_{ijt-1}} + \varepsilon_{ijt}$$

where:

$\text{Total Accruals}_{ijt}$ = total accruals for firm i in two-digit SIC j, year t (note f)

$\Delta ADJREV_{ijt}$ = change in cash-based revenues for firm i in two-digit SIC j, year t equals change in sales (COMPUSTAT #12) − change in receivables (#2)

PPE_{ijt} = gross property, plant, and equipment for firm i two-digit SIC j, year t (#8)

A_{ijt-1} = total assets for firm i in two-digit SIC j, year t − 1 (#6)

ε_{ijt} = error term from the accruals estimation for firm i in two-digit SIC j, year t.

[e] Data for percentage shares held by insiders and number of shareholders is for the year of violation instead of the year prior to violation because data for industry matched firms are not available in the year prior.

[f] Total accruals are calculated as the change in current assets (Compustat item #4), minus the change in cash (#1), minus changes in current liabilities (#5), plus the change in short term debt (#34) minus depreciation and amortization expense (#14) minus deferred tax on earnings (#50) plus equity in earnings (#55). If either deferred taxes or income from equity investments is set equal to missing in the Compustat files, then that item is set equal to zero in calculating total accruals since those numbers are likely immaterial for the firm in question. If any of the other required items is reported as missing in Compustat, that observation is dropped. An alternative calculation of total accruals when data are available is the difference between earnings from continuing operations (#18) and cash flow from operations (#308). This alternative calculation yields similar results.

cannot be distinguished on the following dimensions: size (not surprisingly), liquidity, leverage, profitability, and cash flows. However, GAAP violators are younger, more closely held, have higher growth, and larger positive accruals and discretionary accruals.[10]

Table 1, panel B reports the comparison to the second control sample. The evidence suggests that age-matched firms only differ from GAAP violators in that the latter have larger positive accruals and discretionary accruals. This means that matching on age also results in a control sample consisting of firms that (1) are not distinguishable in terms of size from the GAAP violators sample, (2) are also not distinguishable in terms of growth, age, and ownership structure.

The preceding comparisons suggest that tests based on age-matches are less susceptible to correlated omitted variables. That is, the differences in growth and age between the treatment sample and the size-based control sample matches have the potential to create omitted variable problems since, as discussed above, they are likely to be related to how the SEC selects targets for investigation. It is also possible that differences in ownership structure create an omitted variable bias as Loebbecke et al. (1989) report that charges of fraudulent reporting are more frequent against closely held firms.

To deal with the potential correlated omitted variable problem, I (1) introduce control variables into the model that attempt to explain group membership (treatment vs. control) by managerial incentives to overstate earnings, and (2) estimate two versions of the model (described in the next section); one with and one without the control variables. I use control variables to proxy for those differences between treatment and control firms that are likely to reflect criteria used in the SEC decision to investigate a firm for possible violations of accounting regulations. For example, when size is the basis for selecting the control sample, the Table 1 indicates that the treatment and control variables are different in age, growth, ownership structure, and managerial discretion over accruals. Accordingly, the control variables are proxies for age, growth ownership structure, and managerial discretion over accruals. In results not reported here, I find that variables proxying for the demand for external financing and debt covenant incentives only attain significance in the estimation with size-matches when control variables are removed.[11] To the extent that these control variables capture an increased likelihood that a firm is investigated and charged by the SEC, the results confirm that the estimation based on size-matches suffers from a correlated omitted variable problem.[12] On the other hand, the removal of the control variables in the estimation with age-matches does not alter the significance of the remaining variables and, in the remainder of the paper, I focus on comparing treatment firms with age-matches.

III. ANALYSIS OF POTENTIAL INCENTIVES FOR EARNINGS OVERSTATEMENT

I investigate the same four potential sources of incentives for managers to overstate reported earnings examined in DSS: (1) insider trading, (2) compensation agreements, (3) debt contracts, and (4) the demand for external financing. My analysis of the last three incentives follows directly from DSS and other prior work.[13] However, DSS's insider trading analysis is prompted by reference to practitioners' views of the causes of earnings manipulation. While the practitioners' views represent one reasonable motivation for studying insider trading in the context of earnings overstatement, there is also a relevant academic literature on insider trading that provides a broader perspective for interpreting the evidence on this issue. Consequently, I discuss this literature before discussing the measurement of constructs that proxy for managers' incentives to overstate earnings.

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[10] Discretionary accruals are measured using a modified version of the Jones (1991) model (see Table 1), and suggest that treatment firms manage earnings prior to GAAP violation. Since they also make income-increasing accounting choices prior to the year of GAAP violation, Beneish (1997, 290) suggests that treatment firms violate GAAP either to avoid accrual reversals, or because they have exhausted alternatives to better represent their firms' performance.

[11] The results are available on request.

[12] In their study, DSS (1996, 13) acknowledge that "if the SEC pays special attention to the financial statements of firms registering securities, then the measure [of demand for external financing] may be biased." As discussed above, the SEC closely scrutinizes the financial statements of young firms that issue securities, and this likely yields biases in the coefficient estimates.

Prior insider trading research suggests that managers act as informed traders, buying (selling) in advance of stock price increases (declines) (Jaffe 1974; Seyhun 1986). The personal gains managers realize as a result of trading in their firm's stock are considered an efficient means of compensating managers for providing their private information to investors on a timely basis (Manne 1966; Carlton and Fischel 1983; Dye 1984; Noe 1997).

If managers act as informed traders, I expect them to use their information about earnings overstatement to trade for their own benefit. That is, if managers overstate earnings to provide market participants with positive private information about the firm's prospects, I expect them to either strategically increase their stake in their firm's equity (perhaps to provide another positive signal about firm prospects) or abstain from trading. Alternatively, if managers overstate earnings to hide deteriorating firm performance, I expect them to sell their equity contingent wealth. If overstatement is intended to mislead investors, managers may limit their selling to reduce the likelihood of attracting the attention of the SEC's insider trading monitors. Alternatively, as argued by Summers and Sweeney (1998, 133), managers who mislead investors may possess low personal ethics, low risk aversion and/or a downwardly biased assessment of the probability of getting caught. Yet another possibility is that, in the event of detection, managers could justify their selling for personal liquidity reasons.[14] The discussion above leads me to examine managers' stock transactions using data filed with the SEC pursuant to Section 16 of the 1934 Act and managers' exercise of stock appreciation rights. Managers may be more willing to exercise stock appreciation rights during periods of earnings overstatement than they are to sell their shares because there are no filing requirements for redeeming stock appreciation rights.

In summary, earnings overstatement is alleged to occur for the direct benefit of the manager or for the direct benefit of existing shareholders (and the indirect benefit of managers). Managers can directly benefit from the overstatement by the strategic selling of shares at inflated prices (insider trading), by receiving extra bonus compensation based upon earnings (compensation agreements), or by exercising stock appreciation rights at inflated prices (compensation agreements). Existing shareholders can directly benefit from earnings overstatement by avoiding the costs associated with debt covenant violation or by incurring a smaller cost to obtain external funds. I use proxies for these four sources of incentives to overstate earnings as independent variables in a probit model that has group membership (treatment or control) as a dependent variable. My discussion of the proxies proceeds in the following order: insider trading, compensation agreements, the demand for external financing, and debt covenants.

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[13] Contract-based incentives have been studied in prior positive theory research, and the demand for external financing in research that has shown that managers have incentives to increase earnings at the time of initial (Friedlan 1994; Teoh et al. 1998a) and seasoned equity offerings, (Rangan 1998; Teoh et al. 1998b).

[14] For example, in *Provenz v. Miller* (1996) and in *Searls v. Glasser* (1995), appellate courts ruled that selling stock for the purpose of satisfying tax liabilities or purchasing a new or second home did not constitute illegal insider trading. Evidence that managers' compensation is reduced in times of financial distress (Gilson and Vestuypens 1993) could also justify the sale of shares to maintain current consumption.

Insider Trading

My analysis of managers' trading behavior occurs in the violation period—the period over which the SEC charges the firm with GAAP violation or where media accounts indicate that GAAP violation occurred. As depicted in Figure 1, the violation period starts on the date of the first reporting violation, e.g., the beginning of the fiscal year or quarter for which the SEC's AAERs indicate the first reporting violation or media accounts indicate that the violation occurred. The violation period ends on the earlier of the discovery date or the delisting date. I identify the first disclosure of the actual or alleged GAAP violation to determine the end of the violation period and assess the stock market impact of the public discovery of GAAP violation.[15] The mean and median length of the violation period are 28 and 26.5 months, respectively.

I use two proxies to evaluate managers' behavior with respect to insider trading. First, the variable INTRADE is intended to provide insights about the extent of insider trading. As in John and Lang (1991), INTRADE is a dollar value index computed as (NVP–NVS)/(NVP+NVS) where NVP(NVS) is the amount of purchases (sales) by insiders in the violation period after excluding transactions related to stock issuance.[16] The second proxy, ISSUE % BY INSIDERS, is computed as the fraction of firm offerings that are sold by insiders and is intended to capture the extent to which insiders sell shares as part of security offerings.

My proxies for insider trading activity differ from those used in DSS. The measures used in DSS are based upon the amounts sold by insiders divided by the market value of equity prior to violation. I conjecture that their proxies understate the intensity of selling by insiders relative to control firms as (1) the numerator does not take into account insider purchasers (more likely in control firms) and (2) the denominator is large, as the treatment firms' prices decline relatively more over the violation period. In contrast, my first proxy for insider trading is based upon the ratio of net selling by insiders relative to the total value transacted—a measure widely used in prior research (Seyhun 1986; John and Lang 1991).

Table 2 provides a comparison of the treatment and control samples based upon variables used in the probit analysis. For INTRADE, Table 2 reports that insiders in treatment firms sell significantly more of their holdings than insiders in control firms, suggesting that if insiders act as informed traders, they are selling in anticipation of price declines. For

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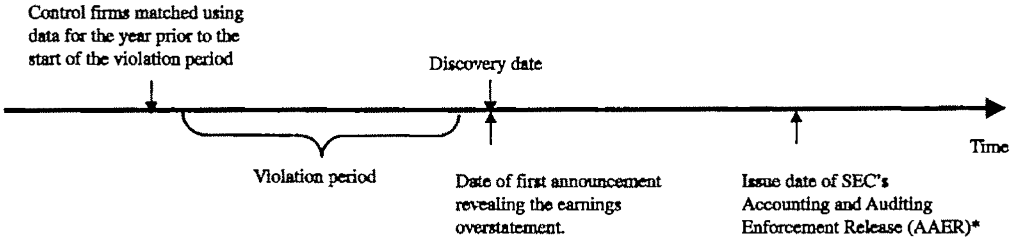
[15] As later described, the first disclosure is typically a news media report. In one case the SEC's AAERs provide the bounds of the violation period. AAER No. 149 (Zondervan Corporation) states: "The Complaint alleges that during the period from at least January 1, 1980 through October 23, 1984, when Zondervan announced its inventory was overstated and its account payable understated..." (*Federal Securities Law Reporter,* 63052). In this case, the violation period starts on January 1, 1980 and lasts 58 months, and the news media indeed contains such an announcement on October 24, 1984.

[16] An alternative computation of INTRADE retains transactions related to stock issuance and yields similar results. INTRADE is preferred because trading at the time of security offerings typically implies selling and may bias the variable against the null. INTRADE is computed based on the 54 GAAP violators and 57 age-matches for which I can find insider trading data. Two features of the computation of the insider trading index are noteworthy. First, when insider trading data are available for a firm but no transactions occur in the violation period, the index is set to 0. This occurs 8 times for GAAP violators and 21 times for age-matches. Second, in addition to firms for which there are no insider transactions in the violation period, I also set the index value to zero when there are fewer than five transactions. The screen follows John and Lang (1991) and takes into account the fact that the construction of the index (bounded between −1 and +1) can reduce the ability to compare intensity of insider trading across firms. That is, for a firm with one sale and no purchase transactions, the index equals −1. On the other hand, the index is −.90 for a firm with one purchase and 19 sale transactions of the same value. To alleviate this problem, I set the index to zero when there are less than five transactions in the violation period. I also reproduce the comparisons by computing the index without the five transactions screen and find similar results.

FIGURE 1
The Violation Period

The Violation Period starts on the date of the first reporting violation, e.g., the beginning of the fiscal year or quarter for which the SEC's AAERs indicate the first reporting violation or media accounts indicate that the violation occurred. The violation period ends on the date of the announcement revealing the earnings overstatement.


Control firms matched using data for the year prior to the start of the violation period
Discovery date
Time
Violation period
Date of first announcement revealing the earnings overstatement.
Issue date of SEC's Accounting and Auditing Enforcement Release (AAER)*

* For 54 of 64 sample firms, AAERs are typically issued two years after the discovery date.

ISSUE% BY INSIDERS, Table 2 reports that the percentage sold by insiders as part of security offerings is significantly larger for GAAP violators (.089) than for age-matches (.025). In a Leland and Pyle (1977) world where the percentage retained by insiders signals their private valuation, the finding suggests poorer prospects for GAAP violators than for control firms. The selling behavior at the time of security offerings is consistent with that observed outside of security offerings (INTRADE).

Compensation Agreements

I use two proxies to capture the incentive effects of compensation agreements. First, like DSS, I use a variable called BONUS—a dummy variable coded 1 (0) if proxy statements in the violation period indicate (do not) the existence of a bonus plan. Table 2 indicates no appreciable difference in the proportion of firms that use bonus plans to compensate managers. Second, I use a variable called SAR—a dummy variable coded 1 (0) if managers (do not) redeem stock appreciation rights in the violation period.[17] Table 2 reports that managers in treatment firms are significantly more likely to redeem their stock appreciation rights.

The Demand for External Financing

I use the two proxies proposed by DSS (1996, 12–13): (1) EXFIN—a dummy variable coded 1 if the ratio of cash flow from operations less average capital expenditures to current assets is less than −0.5 (a detailed definition is in Table 2)—as an *ex ante* measure of the demand for external financing, and (2) ISSUE—a dummy variable coded 1 if the firm issued securities in the violation period—as an *ex post* measure of the demand for external financing. In Table 2, EXFIN indicates that GAAP violators' external funding requirements (27.9 percent) are similar to those of age-matches (28.2 percent). In terms of ISSUE, I find that GAAP violators issue equity securities with a frequency (28.1 percent) not statistically distinguishable from that of age-matches (17.5 percent).

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[17] To determine whether managers redeem stock appreciation rights, I subtract the net realizable value (the difference between the market price on the date of exercise and the exercise price) computed using insider trading data from the net realizable value reported in proxy statements during the violation period. Managers who acquire stock by exercising the stock option component of an option grant are required to report the acquisition to the SEC under Section 16 of the 1934 Act. If managers indeed make such filings, the difference in the net realized values computed above represents the cash received by managers upon redeeming stock appreciation rights. Since insider trading data are required to compute SARs, the statistics are based on 54 GAAP violators and 57 age-matches.

TABLE 2
Descriptive Statistics on Model Variables Across Treatment and Control Samples

	GAAP Violators				*Age-Matches*				
Variable^a	*Mean (std. dev.)*	*Lower Quartile*	*Median*	*Upper Quartile*	*Mean (p-value)*	*Std. Dev.*	*Lower Quartile*	*Median (p-value)*	*Upper Quartile*
Insider Trading									
INTRADE	−.348 (.524)	−.884	−.174	.000	−.032 (.01)	.433	.000	.000 (.01)	.000
ISSUE % BY INSIDERS	.089 (.206)	.000	.000	.000	.025 (.03)	.097	.000	.000 (.04)	.000
Compensation									
BONUS	.578 (.522)	.000	1.000	1.000	.562 —	.500	.000	1.000 (.50)	1.000
SAR	.296 (.461)	.000	.000	1.000	.123 —	.331	.000	.000 (.03)	.000
External Finance									
EXFIN	.279 (.452)	.000	.000	1.000	.282 —	.454	.000	.000 (.81)	1.000
ISSUE	.281 (.454)	.000	.000	1.000	.175 —	.385	.000	.000 (.16)	.000
Debt Covenants									
TECHDEF	.187 (.393)	.000	.000	.000	.109 —	.315	.000	.000 (.34)	.000
LEV	.606 (.442)	.321	.560	.726	.527 (.20)	.219	.357	.524 (.11)	.624
Control Variables									
INSIDE %	.330 (.203)	.172	.297	.443	.306 (.61)	.241	.085	.246 (.43)	.488
VPRET	−.492 (.569)	−.953	−.725	−.166	.101 (.01)	1.326	−.515	−.272 (.01)	.264
TIMEL	44.45 (63.19)	11.00	19.00	48.00	59.80 (.65)	79.35	11.00	35.00 (.54)	66.00
DA	.545 (1.828)	−.145	.084	.609	.040 (.02)	.485	−.206	−.015 (.04)	.231

(*Continued on next page*)

TABLE 2 (Continued)

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[a] Variable definitions

INTRADE = I found insider trading data for 54 GAAP violators and 57 age-matches in the National Archives and Records Administration Ownership Report and CDA/Investment Inc.'s Insider Trading Monitor. For these firms, a dollar value index computed as (NVP − NVS)/(NVP + NVS) where NVP (NVS) is the aggregate dollar amount of purchases (sales) by insiders in the violation period after eliminating transactions related to stock issuance. The index scales for the size effect in insider trading, but by construction is bounded between −1 and +1. This can reduce ability to compare intensity of insider trading across firms (John and Lang 1991). That is, for a firm with one sale and no purchase transactions, the index equals −1. On the other hand, the index equals -.90 for a firm with one purchase and 19 sale transactions of equal value. As a result, I require firms to have five insider transactions or more in the violation period to compute the index. That is, conditional on having found insider trading data, for firms with fewer than five transactions, I set the index to zero.

ISSUE % BY INSIDERS = Cash proceeds to insiders divided by total cash proceeds to the firm. This variable is the product of the variable ISSUE (defined below) and the percentage.

BONUS = 1 if the firm has a bonus plan, 0 otherwise.

SAR = 1 if managers redeem stock appreciation rights in the violation period and 0 otherwise. To determine whether managers redeem stock appreciation rights, I subtract the net realizable value (the difference between the market price on the date of exercise and the exercise price) computed using insider trading data from the net realizable value reported in proxy statements during the violation period. Managers who acquire stock by exercising the stock option component of an option grant are required to report the acquisition to the SEC under Section 16 of the 1934 Act. If managers indeed make such filings, the difference in the net realized values computed above represents the cash received by managers upon redeeming stock appreciation rights. Since insider trading data are required to compute SARs, the statistics are based on 54 GAAP violators and 57 age-matches.

EXFIN = As defined by DSS (1996, 15) is a dummy variable coded 1 if Free C is less than −0.5, 0 otherwise, where Free C is defined as (Cash from Operations t − average Capital Expenditures from $_{t-3}$ to $_{t-1}$)/Current assets $_{t-1}$ and $_t$ represents the first year of violation. The statistics presented are based on 61 GAAP violators and 64 age-matches.

ISSUE = 1 if the firm has issued equity securities in the violation period, 0 otherwise. Data for public offerings of equity securities are obtained from Security Data Corporation.

TECHDEF = 1 if the firm is in technical default within two years of the end of the violation period, 0 otherwise.

LEV = Total Debt to Total Assets, Table 1, note a.

INSIDE % = See Table 1, note b.

VPRET = Holding period return in the violation period. The violation period ends on the date of delisting for 14 of the 64 firms. Following Sloan (1996), I set the violation period return for those firms −100 percent. The comparisons across samples are unaffected by the elimination of these 14 firms.

TIMEL = time listed, see Table 1, note a.

DA = Discretionary Accruals, see Table 1, note d.

[b] Parenthesis under mean (median) indicate p-value from a t-test (median test). For discrete variables, only the p-value for a Chi-square test is reported (in parenthesis under Median). The p-values are for one-tailed tests when a directional prediction is made, two-tailed tests otherwise.

Debt Covenants

I use two proxies to capture managers' incentive to avoid the violation of debt agreements. Although leverage (LEV)—defined as total debt to total assets in the year prior to the first year of violation—has been shown to be a poor proxy for the closeness to covenant constraints (see among others Beneish and Press 1995), I use it as a measure of the incentive to avoid covenant default prior to the violation period because it was used in DSS. The second proxy (TECHDEF) is an indicator variable identifying actual instances of technical default.[18] Table 2 reports that the samples are not statistically distinguishable in terms of leverage. In terms of actual technical default, I find that GAAP violators experience technical default with a frequency (18.7 percent) not statistically distinguishable from that of age-matches (10.9 percent).

Univariate Comparisons to DSS

In their univariate comparisons, DSS only report statistically significant differences for variables relating to the demand for external financing and the effect of debt covenants. As indicated above, I find significant differences between the treatment and age-based control samples for two measures of insider trading activity and a tendency to redeem SARs, and no significant differences in either the demand for external financing or debt covenant proxies. These differences between this paper and DSS need explanation. For the variables relating to the demand for external financing and debt covenants, the differences are due to the fact that the results I report are based on a comparison of age-matched samples rather than size-matched samples. To explain, when I compare GAAP violators to size matches (like in DSS), I find that (1) EXFIN indicates that GAAP violators require significantly more external funding than size matches (27.9 vs. 10.9 percent), (2) ISSUE indicates that GAAP violators issue equity securities more frequently than size matches (28.1 vs. 9.4 percent), and (3) TECHDEF indicates that GAAP violators experience technical default with a significantly higher frequency than size-matches (18.7 vs. 4.7 percent).

However, for variables relating to insider trading activity and compensation, the differences are not due to matching on age since comparing GAAP violators with either age or size matches yields similar results. Rather, I attribute the difference in results to the fact that I use constructs that increase the likelihood of detecting an effect. That is, with respect to compensation, I obtain significant differences across samples by using SARs to capture managers' behavior with respect to their equity-based compensation. Although equity-contingent compensation likely represents an important means of compensating managers in young growth firms, this variable was not considered by DSS. In addition, I find no difference in insider selling when I use DSS's proxy for insider selling in the violation period (amount sold by insiders divided by market value of equity prior to violation). This confirms my earlier conjecture that their proxy understates the intensity of selling by insiders relative to control firms.

Multivariate Analysis

I discuss below the specification and estimation results of probit regressions that jointly consider potential motivations for earnings overstatement. The dependent variable is 1 for GAAP violators and zero for control firms. The independent variables consist of the proxies for potential motivations in the preceding discussion as well as four control variables. Three of the control variables—percentage held by insiders (INSIDE %), violation period return (VPRET) and time listed (TIMEL)—are surrogates for an increased likelihood that a firm is investigated and charged by the SEC (Loebbecke et al. 1989; Feroz et al. 1991; Kile 1996), and the fourth, discretionary accruals (DA), for an increased likelihood that the firm has run out of ways to increase earnings within GAAP (Beneish 1997).

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[18] The procedure to identify subsequent technical default is similar to that of DSS. That is, I use key word searches in Beneish and Press (1993) on NAARS over the violation period and a two-year period after the end of the violation period. There are two default announcements that occur shortly before the announcement revealing the overstatement and ten that occur subsequently. The rationale for looking at the period after discovery is that firms which subsequently default are more likely to have manipulated in order to avoid default.

Table 3 presents the correlations for the combined samples of treatment firms and age-matches.[19] Only seven of 45 correlation coefficients are significant at the 5 percent level or lower and three of the seven coefficients involve either alternative proxies for insider trading or the ISSUE variable (the correlation between ISSUE and ISSUE % BY INSIDERS is .772, while the correlation between INTRADE and ISSUE % BY INSIDERS is −.368 and that between INTRADE and ISSUE is −.319). Collinearity is not likely a problem—the highest order condition from the Influence option in SAS is 7.77 when a model including all three of the variables is estimated using OLS. However, in Table 4, I present three specifications of the model.[20]

The variable INTRADE is significant in all specifications, and the negative coefficient suggests that insiders in GAAP-violating firms are more intensely involved in selling personal holdings. The variable ISSUE % BY INSIDERS is significant at the 7 percent and 9 percent levels, and its positive coefficient suggests that managers are more likely to sell their holdings as part of a security offering in firms overstating earnings. In addition, a Wald test rejects in each specification the hypothesis that the coefficients on proxies for managers' trading behavior (INTRADE and ISSUE % BY INSIDERS) are zero. Similarly, the SAR variable is significant in all specifications, and the positive coefficient suggests that treatment firm managers are more likely to redeem their stock appreciation rights.

The variables proxying for the demand for external financing and for debt covenants incentives do not attain significance. The results are similar when EXFIN and LEV are substituted for ISSUE and TECHDEF (not reported). Similar to DSS, the indicator for the existence of a bonus plan (BONUS) does not attain significance. Among control variables, the coefficient on DA is positive and significant, potentially suggesting accrual management prior to GAAP violation. The coefficient on the VPRET variable is negative and significant, suggesting that the SEC is more likely to charge firms with poor security return performance (Feroz et al. 1991; Kile 1996).[21]

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[19] The correlation matrix and the estimation of the model are based on 49 GAAP violators and 49 age-matches. The reason is that the computation of the INTRADE and SAR variables for control firms is based on a violation period of length equal to that of the corresponding treatment firm. Thus, in the spirit of the matched-pair design, I not only eliminate firms for which insider trading data are unavailable in each sample, I also eliminate firms for which insider trading data are unavailable for one component of the matched pair. I have, however, estimated the probit models with 54 GAAP violators and 57 age-matches and obtained similar results.

[20] Specification 1 contains both the INTRADE and ISSUE variables, Specification 2 contains INTRADE, ISSUE, and ISSUE % BY INSIDERS and Specification 3 contains INTRADE and ISSUE % BY INSIDERS. The likelihood ratio test indicates that all specifications have significant power, with χ^2 statistics (p-values) ranging from 43.505 (<.001) to 46.908 (<.001), and descriptive validity, with pseudo-R^2s ranging from 33.07 percent to 37.06 percent.

[21] To assess whether the results are driven by a few outlying observations, I rely on the diagonal elements of the hat matrix as estimated using the Influence option in SAS. The values of the diagonal elements of the hat matrix (hereafter, h-values) are always between 0 and 1; Neter et al. (1989, 394–397) describe two guidelines to assess whether an observation is an outlier. One guideline is to consider as outliers observations with h-values exceeding .5, and another is to treat as outliers observations with h-values in excess of the following ratio: (2*number of parameters)/(number of observations in the estimation). Using these guidelines, I find that the results are not driven by outliers. For example, for Specification 1 in Table 4, the highest estimated h-value (.237) is well below the .5 guideline. In addition, estimating the model with the 94 observations whose h-values are lower than .204 (20/98) yields estimates that are similar in magnitude and in significance to those reported in Table 4.

TABLE 3
Combined Sample of GAAP Violators and Age-Matches
(n = 98)[a]

	INTRADE	*ISSUE % BY INSIDERS*	*BONUS*	*SAR*	*ISSUE*	*TECHDEF*	*INSIDE %*	*VPRET*	*TIMEL*	*DA*
INTRADE	1.000 (.00)									
ISSUE % BY INSIDERS	−.368 (.01)	1.000 (.00)								
BONUS	.123 (.22)	.031 (.83)	1.000 (.00)							
SAR	−.105 (.30)	.077 (.94)	.188 (.06)	1.000 (.00)						
ISSUE	−.319 (.01)	.772 (.01)	.159 (.08)	−.016 (.87)	1.000 (.00)					
TECHDEF	−.065 (.51)	−.022 (.82)	−.014 (.89)	.257 (.01)	−.022 (.82)	1.000 (.00)				
INSIDE %	.095 (.34)	−.046 (.65)	−.082 (.42)	−.064 (.52)	−.047 (.65)	−.099 (.65)	1.000 (.00)			
VPRET	.194 (.05)	−.104 (.30)	−.009 (.93)	−.065 (.52)	−.021 (.98)	−.003 (.98)	−.073 (.47)	1.000 (.00)		
TIMEL	.041 (.69)	−.177 (.08)	.114 (.25)	.123 (.22)	−.274 (.01)	−.009 (.93)	−.407 (.01)	.086 (.40)	1.000 (.00)	
DA	.008 (.94)	.146 (.14)	.193 (.06)	.071 (.48)	.185 (.07)	−.085 (.40)	−.073 (.46)	−.060 (.46)	−.011 (.92)	1.000 (.00)

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[a] Variables are defined in Table 2. The reported correlation coefficients are Spearman-rank correlation coefficients for correlations involving discrete variables (SAR, ISSUE, TECHDEF, BONUS) and Pearson correlations otherwise. The p-values are for two-tailed tests.

TABLE 4
Probit Analysis of Differences Between GAAP Violators and Age-Matches Coefficients, p-values, Pseudo-R^2 and χ^2 Statistics of Log Likelihood Ratio[a]

Variable[b]	*Predicted Sign*	*Specification 1*[c]	*Specification 2*[c]	*Specification 3*[c]
Constant		.640 (.18)[d]	−.611 (.21)	−.688 (.13)
INTRADE	(?)[d]	−.779 (.02)	−.659 (.05)	−.643 (.13)
ISSUE % BY INSIDERS	(?)[d]	— —	3.153 (.09)	2.510 (.07)
BONUS	(+)	−.379 (.25)	−.483 (.08)	−.466 (.09)
SAR	(?)[d]	1.306 (.01)	1.393 (.01)	1.380 (.01)
ISSUE	(+)	.334 (.21)	−.288 (.31)	— —
TECHDEF	(+)	−.016 (.49)	.006 (.49)	.025 (.48)
INSIDE %		−.505 (.54)	−.522 (.54)	−.442 (.59)
VPRET		−.998 (.01)	−1.046 (.01)	−1.032 (.01)
TIMEL		.003 (.30)	.003 (.25)	.003 (.20)
DA		.631 (.03)	.643 (.04)	.649 (.03)
Pseudo R^{2e}		33.07%	37.06%	36.72%
χ^2-statistic[e]		43.505	46.908	46.633
p-value		(.001)	(.001)	(.001)
Wald χ^{2f}		5.775	7.470	9.330
p-value		(.016)	(.024)	(.001)

(Continued on next page)

Overall, the evidence suggests that managers who overstate earnings reduce their equity contingent wealth by selling shares and redeeming stock appreciation rights.[22] If by

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[22] The analysis does not distinguish treatment firm managers who are subsequently charged with earnings overstatement from those who are not. While this is likely a limitation, managers who are subsequently charged account for approximately for 82 percent of net shares sold during the violation period, and for 79 to 89 percent of the estimated gains (discussed later) realized by trading in the violation period.

TABLE 4 (Continued)

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[a] The estimation is based on 98 observations as described in Table 3 and note 19.

[b] The dependent variable identifies GAAP violators with values of one and age-matches with values of zero. The independent variables are defined in Table 2.

[c] The three specifications are presented to allow an evaluation of the effect of the correlation between insider trading and security issuance variables. Specification 1 contains both INTRADE and ISSUE, Specification 2 contains INTRADE, ISSUE % BY INSIDERS and ISSUE and Specification 3 contains INTRADE and ISSUE % BY INSIDERS.

[d] p-values are for one-tailed tests when a directional prediction is made, and for two-tailed tests otherwise. Signs for INTRADE, ISSUE % BY INSIDERS, and SAR are expected to be positive, negative, and negative if the earnings overstatement is a signal of managers' private information about favorable future prospects and they take trading positions consistent with this information. The signs are expected to be negative, positive, and positive if the earnings overstatement is a misrepresentation of future prospects and managers take positions consistent with this view.

[e] The pseudo-R^2 is equal to $(L_\Omega^{2/n} - L_w^{2/n})/(1 - L_w^{2/n})$ where L_Ω is the log likelihood for the unconstrained probit model, L_w is the log likelihood with only the constant term in the model (constrained) and n the number of observations (see Maddala 1983, 40). The log likelihood ratio test statistic, equal to -2 times the difference in the log likelihood of the unconstrained and constrained models, is asymptotically distributed χ^2, with degrees of freedom equal to the difference in the number of parameters of the two models.

[f] Wald test that coefficients on the insider trading variables (INTRADE and ISSUE % BY INSIDERS) are zero. The degrees of freedom are 1, 2, and 2, respectively, in Specifications 1, 2, and 3.

overstating earnings managers are successful in misleading investors and delaying stock prices declines, managers benefit from earnings overstatement by selling at higher prices. I investigate this issue next by providing evidence on the stock market reaction to revelation announcements and on the costs of settling litigation related to the earnings overstatement.

Stock Market and Litigation Cost Analyses

I describe below the stock market impact of discovery announcements in my sample and whether the observed stock market impact is due to changes in litigation costs or to the release of contemporaneous information that is unrelated to the overstatement. Feroz et al. (1991) and DSS document significant price declines coincident with and following the announcement of the SEC accounting enforcement action and I expect to find such a negative reaction in my sample of treatment firms. Such a finding is consistent with dramatic shareholder wealth losses, but concluding that such a finding means that stock prices are inflated in the violation period is premature for two reasons: (1) the stock price losses likely reflect changes in expected litigation costs, (2) the stock price losses may reflect the release of concurrent information that is unrelated to the overstatement. I thus investigate the costs of litigation and conduct a contamination analysis.

Stock Market Impact

In Table 5, the stock market impact of announcements of actual or alleged GAAP violation is represented by market-adjusted and risk-adjusted abnormal returns.[23] Because results are similar with both abnormal return metrics, I limit my discussion below to risk-adjusted returns. Risk-adjusted abnormal returns average −.525 and −.285 in 12- and three-month periods prior to discovery. This suggests, given the length of the violation period (mean 28 months), that on average GAAP violators also have declining security performance after overstating earnings. It is also consistent with the SEC accounting enforcement actions targeting firms with poor return performance.[24] Average abnormal returns in holding periods ranging from three days to two weeks surrounding the event date indicate significant shareholder wealth losses ranging from −.202 to −.251. The corresponding medians are −.176 and −.213 and few firms have positive abnormal returns, leading to a rejection of the null that the proportion of positive and negative abnormal returns are equal.

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[23] The analysis is based on 50 of the 64 firm for which the discovery announcement occurs prior to delisting. Details of the measurement of abnormal returns and the selection of event dates appears in Table 4.

Litigation Costs

I obtain settlement data on class-action suits related to the earnings overstatement using an extensive search described in Table 5, note d. I find that class-action suits are brought against 42 of the 50 firms in the stock market analysis. I obtain settlement data for 36 of these 50 firms as two suits are dismissed, two are pending, and the settlement data for two

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[24] Indeed, I find that discovery announcements follow bad news, as these usually prompt SEC investigations. The source of discovery is either the firm itself or its auditors for 26 firms. SEC investigations also follow delisting by Stock Exchanges for various reasons including bankruptcy and insufficient capital in 14 cases. Complaints and lawsuits by disgruntled employees and shareholders lead by a few months the initiation of SEC investigations for 10 firms. The SEC also initiates investigations following tips from the FBI and District Attorneys indicating that a criminal investigation is under way for four firms.

TABLE 5
Stock Market Effect of Overstatement Announcements and Costs of Settling Subsequent Litigation

Panel A: Stock Market Effects

Period Relative		*Market-Adjusted*				*Risk-Adjusted*			
to the Event Day[b]	*n*	*Mean*	*Median*	*t-stat*[a]	*# positive*	*Mean*	*Median*	*t-stat*[a]	*# positive*
−300, −61	49	−.178	−.182	−2.15	15[c]	−.525	−.332	−3.90	13[c]
−60, −2	50	−.243	−.237	−6.34	9[c]	−.285	−.246	−5.94	9[c]
−1, +1	50	−.208	−.173	−7.74	3[c]	−.202	−.176	−7.50	3[c]
+2, +60	48	−.173	−.233	−3.46	14[c]	−.113	−.099	−2.05	15[c]
−3, +3	50	−.221	−.213	−8.80	3[c]	−.208	−.194	−8.12	4[c]
−5, +5	50	−.268	−.222	−8.92	5[c]	−.251	−.213	−8.06	5[c]

Panel B: Costs of Settling Subsequent Litigation[d]

		Settlement Costs as a Percentage of Market Value of Equity Prior to Discovery (A)[e]		*Difference Between Window Abnormal Returns and Settlement Costs in A*[e]	
	n	*Mean*	*Median*	*Mean*	*Median*
Whole Sample	50	8.6%	6.5%	−11.6%	−9.4%
p-Value Wilcoxon Signed Rank Test					.001[f]
Subsample of nonzero settlement costs	36	11.8	10.2	−13.5	−13.5
p-value Wilcoxon Signed Rank Test					.001

(*Continued on next page*)

TABLE 5 (Continued)

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[a] Abnormal Returns are computed for each firm i in each period of T days as follows:

$$\text{Market Adjusted Abnormal Returns}_{iT} = \left(\prod_{t=1}^{T}(1 + R_{it}) - 1\right) - \left(\prod_{t=1}^{T}(1 + R_{mt}) - 1\right)$$

$$\text{Risk Adjusted Abnormal Returns}_{iT} = \left(\prod_{t=1}^{T}(1 + R_{it}) - 1\right) - \left(\prod_{t=1}^{T}(1 + \hat{\alpha}_i + \hat{\beta}_i R_{mt}) - 1\right)$$

where R_{it}, R_{mt} are the returns for firm i and the equally weighted CRSP index on day t, $\hat{\alpha}_i$ and $\hat{\beta}_i$ are firm i's estimates from market model regression estimated over 200 trading days prior to the period of analysis and reestimated every 200 trading days. I require a minimum of 100 trading days in any 200-day period to estimate market model parameters. When less than 100 trading days are available I set α_i and β_i to 0 and 1, respectively. T-statistics are computed using the sample cross-sectional variance.

[b] The event date (day 0) is the first announcement of a firm's violation or alleged violation. The analysis is based on 50 firms because for 14 firms the discovery occurs after delisting from stock exchanges. The source of the event dates is the *Wall Street Journal* (41 times), wire services (eight times) and *Barron's* (once). The 50 disclosures consist of announcements of (a) SEC investigations, including charges by the SEC or joint criminal investigations (24 times), (b) internal investigations, including suspensions or firing of officers for wrongdoing or embezzlement, CEO resignations, directors or new CEOs questioning accounting practices, withdrawals of financial statements, and indications that material adjustments are required (19 times), (c) auditors resigning, withdrawing previous years opinions, disagreeing with management, and requiring restatements (seven times).

[c] The hypothesis that the proportion of firms with positive CAPEs is equal to .5 is rejected at the 5%.

[d] To assess litigation costs, I examine the incidence and settlements of SEC sanctions and class-action suits brought by shareholders against sample firms. The data on charges and settlements come from three sources: (1) SEC's litigation releases and AAERs, (2) the following libraries in Lexis/Nexis: OMNI (contains court decisions, SEC releases), CLSDRV (class-action and shareholder derivative litigation), and ALLNWS (news items from various sources), and (3) Palmrose's (1999) database. The Lexis/Nexis searches were conducted with the following key words: litigat!, lawsuit!, sue!, settle!, and shareholder or stockholder within two words of class action. I found details of charges and settlements by the SEC in court filings, but civil suits were typically settled out of court and settlement data came primarily from news reports.

[e] Market value equity prior to discovery is measured at the end of day −2 relative to the announcement. The window abnormal return used in the difference computation is the three-day risk-adjusted abnormal return. Similar results obtain using the corresponding market-adjusted abnormal return.

[f] Test of the null hypothesis that settlement costs equal the market value loss at discovery.

more indicate amounts paid either by officers and directors or their insurance companies but not the firm itself.[25] Table 5, panel B reports that for the whole sample, the average amount paid by firms to settle the class action suits represents 8.6 percent of firms' market value prior to the discovery announcement (the median is 6.5 percent). The mean and median differences between the stock price reaction at revelation and the cost of settling shareholder litigation equal −11.6 percent and −9.4 percent. A Wilcoxon Signed Rank Test indicates that such difference is significantly negative at the .001 level. Similarly, for the 36 firms for which there are both settlement data and a discovery date, the stock price reaction is on average −24.7 percent and settlement costs average 11.8 percent of firms' market value prior to the discovery announcement. Indeed, the average difference between the stock price reaction at revelation and the cost of settling shareholder litigation is −13.5 percent. A Wilcoxon Signed Rank Test also indicates that such difference is significantly negative at the .001 level.

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[25] The 14 firms without settlement data include eight firms for which there is no evidence that a lawsuit was filed. These eight firms are similar in size, growth, and leverage to their sample complement, but they have a significantly different negative price response (−7.7 percent on average) to the announcement that reveals the overstatement than the sample complement (−21.7 percent on average).

If investors have unbiased expectations about the costs of settling anticipated litigation, discovery announcements lead to a significant price revision independent of expected litigation because it is unlikely that the time costs and cash outlays of defending against SEC and civil litigation are as high as 11.6 percent of market value. In addition, the computed upper bound for transaction costs is low because it assumes that, prior to the announcement, expected costs of litigation are zero.[26]

Contamination Analysis

The announcements that reveal the GAAP violation typically contain an indication of the length of the violation period, but otherwise contain little additional information. For example, three of them trace the beginning of the violation period to the time of a security offering, two of them discuss insider trading, and eight of them also contain earnings information. It is likely that the concurrent earnings information indicates the extent to which earnings are overstated.[27] However, if the concurrent earnings information is independent of the earnings overstatement, the stock price reaction at discovery cannot solely be attributed to the discovery of the overstatement.

As such, I treat as contaminated the eight cases where the announcement contains earnings information. I find that price losses for firms with concurrent announcements (contaminated) in days −1 to +1 are larger (eight firms average −.270) than their uncontaminated counterparts (42 firms average −.189), p-value .07. I also find that abnormal returns in the period +2, +60 differ in contaminated (−.026) and uncontaminated subsamples (−.119). I examine whether the differing price response in days +2 to +60 arises from further information about the extent of overstatement being revealed. I find that the correlation coefficient between abnormal returns during the interval (−1, +1) and the interval (+2, +60) is significantly positive .332 (p-value .032) for the uncontaminated subsample and significantly negative for the uncontaminated subsample −.747 (p-value .033). To the extent that the correlations indicate that the earnings information and the overstatement information are part of the same event, then price losses on days −1 to +1 understate the extent to which prices were inflated in the violation period for the uncontaminated group of treatment firms.

Overall, the evidence suggests that managers use their knowledge of the earnings overstatement to trade for their own benefit. It is consistent with earnings overstatement being successful in misleading investors and delaying stock price declines.[28] The evidence does not support the proposition that the purpose of earnings overstatement is the procuring of external funds at lower cost. These findings contrast sharply with those of DSS. The difference in findings regarding the self-serving nature of earnings overstatement for these firms stems from the use of different proxies for insider trading and compensation incentives than those used in DSS. I believe my proxies for insider trading are more valid than those in DSS and that the exercise of stock appreciation rights is a relevant variable that was not considered by DSS. The difference in findings regarding the external funding incentive stems from the difference in the nature of the control sample. The age-based control does not support the idea that the extreme earnings overstatement investigated here is motivated by external funding considerations.

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[26] I also consider the possibility of investor overreaction to the discovery announcement because this could result in investors having biased expectations of litigation costs and/or firm value. This follows Lev and de Villiers (1994) who argue that using the price at discovery overstates 10b-5 damages, and suggest to wait for the return to an equilibrium price because they view "stock price crashes" as short-term phenomena. However, examining the stock price reaction in the three months following discovery, I find no evidence of price reversals. Indeed, from days +2 to +60, holding period abnormal returns average −.113, significant at the 5 percent level.

[27] In six instances these announcements occur concurrently (in days −1 to +1) with an earnings announcement and, in two instances, concurrently with news that management has revised downward its forecast of earnings for the current fiscal year. For example, Caterpillar announces on June 25, 1990 that it expects lower earnings for the year ending December 31, 1990. Caterpillar holds conferences with analysts on June 26, 1990 leading analysts to revise by half their annual forecast of earnings.

IV. PENALTIES SUBSEQUENT TO DISCOVERY

Part of the debate about the efficacy of insider trading rules depends upon the deterrent that stems from the penalties that would be imposed on firm managers who benefit by trading on knowledge of a firm's poor performance. In this section of the paper, I investigate whether managers in firms overstating earnings are more likely to lose their employment post-discovery than managers in firms not overstating earnings, and whether the SEC imposes penalties on managers in firms with overstated earnings.

Employment Losses

This subsection presents evidence on post-discovery top management turnover in firms overstating earnings and in firms not overstating earnings. I identify employment losses from three sources: (1) LEXIS/NEXIS searches under the ALLNWS and COMPNY (EXEC BIOS) libraries with key words (fire!, resign!, suspen!, and quit!) associated with the name of every sample firm, (2) a company and manager name search on *Standard & Poor's Register of Corporations, Executives, and Directors* (Standard & Poor's 1984–1996), (3) proxy statements (when filed subsequent to discovery). The search spans the year of discovery, and, following Gilson (1989) who examines management turnover among firms in financial distress, the four years subsequent to discovery.

In Table 6, Panel A, I report several comparisons of employment losses in treatment and control firms. For the whole sample, the comparisons reveal no significant differences in employment losses for either CEOs or all officers between treatment and control firms.[29] Given evidence in Gilson (1989, 1990) that firms in bankruptcy experience significant managerial turnover, I also investigate employment losses using a sample partition based on whether firms file for bankruptcy in the four years subsequent to discovery. Similar to

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[28] The type of sample limits generalization because it consists of instances of earnings overstatement extreme enough to warrant regulatory action. Indeed, it is possible the SEC subsequently charges sample firms with violating GAAP at least in part as a result of their monitoring of security registration filings and insider trading activity. That is, if insider trading explains both managers' decision to overstate earnings and the SEC's decision to investigate and charge firms, it is difficult to distinguish whether the observed results reflect managers' trading incentives or the SEC scrutiny. As such, I also estimate a bivariate probit model with partial observability that considers the dependent variable to be the result of two sequential decisions (Abowd and Farber 1982; Maddala 1983). While my tests suggest that a variable proxying for the intensity of insider trading in the violation period is more likely to be associated with incentives to overstate than with the process that determines the SEC action, none of the bivariate probit estimations dominate the univariate probit model.

[29] The mean age for the treatment and control firm officers that are fired or resign is 48.9 and 51.1 years, respectively. Because the observed employment losses could be due to officers being of retirement age, I reproduce the comparison after eliminating either officers with ages of 65 or greater and officers aged 60 or greater and find similar results (p-value of Wilcoxon Rank sum tests are .45 and .48, respectively).

TABLE 6
Employment Losses and Bankruptcies Subsequent to Discovery[a]

Panel A: Employment Losses in Treatment and Control Samples

	Treatment Sample			*Control Sample*			*Wilcoxon-Z (p-value)*[c]		
	Whole (n = 64)	*Bankrupt (n = 29)*	*Non-Bankrupt (n = 35)*	*Whole (n = 64)*	*Bankrupt (n = 8)*	*Non-Bankrupt (n = 56)*	*Whole*	*Bankrupt*	*Non-Bankrupt*
Officers Fired or Resigned	70	52	18	89	28	61			
Officers Fired or Resigned as a Percentage of Total Officers	27.6%	40.0%	14.5%	35.8%	49.1%	31.9%	−.52 (.60)	.11 (.91)	−1.08 (.28)
CEO Fired or Resigned	23	15	8	15	4	11			
CEO Fired or Resigned as a Percentage of Number of Firms	35.9%	51.7%	22.8%	23.4%	50.0%	19.6%	1.21 (.23)	.32 (.75)	.69 (.49)

(*Continued on next page*)

TABLE 6 (Continued)

Panel B: Employment Losses, and Subsequent Employment for Managers Charged with GAAP Violation

	Bankrupt *(n = 29)*	*Non-bankrupt* *(n = 25)*	*Wilcoxon-Z (p-value)*[c]
Officers Fired or Resigned	52	18	2.92
Officers Fired or Resigned as a Percentage of Officers Charged	46.8%	26.9%	(.01)
CEO Fired or Resigned	15	8	1.84
CEO Fired or Resigned as a Percentage of Number of Firms	51.7%	22.8%	(.07)
Subsequent Employment[d]	14	7	3.91
Subsequent Employment as a Percentage of Fired or Resigned	26.9%	38.9%	(.01)

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[a] To assess manager's employment losses I rely on various sources: (1) LEXIS/NEXIS searches under the ALLNWS and COMPNY (EXEC BIOS) libraries with key words (fire!, resign!, suspen!, and quit!) associated with the name of every sample firm, (2) a company and executive name search on *Standard and Poor's Register of Corporations, Executives and Directors*, and (3) proxy statements (when filed subsequent to discovery). The search spans the year of discovery, and, following research that examines management turnover among firms in financial distress (Gilson 1989), the four years subsequent to discovery. I determine whether a firm files for bankruptcy in the same time span by conducting Lexis/Nexis searches under the ALLNWS and COMPNY libraries.

[b] The names of officers charged apppear either in the SEC's AAERs or in documentation related to lawsuits (court filings, news articles about settlements).

[c] The statistics reported are for Wilcoxon Rank sum tests and the p-values are based on two-tails.

[d] The search for subsequent employment is unlikely to be complete. That is, name searches yield multiple matches but without access to social security numbers, it is not possible to track individual officers' future employment. The data reported comes from instances where data sources indicated that the officer was formerly employed by a sample firm.

the whole sample, I find no significant differences in employment losses across treatment and control samples.[30]

I also investigate employment losses and subsequent employment among the 178 managers who are charged with earnings overstatement by the SEC (121) and in civil litigation (57). Panel B of Table 6 reports that, in firms that subsequently file bankruptcy, 52 of the 111 (47 percent) officers either resign or are fired. This is significantly higher than the 18 of the 67 officers (27 percent) charged with overstating earnings that suffer the same fate among non-bankrupt firms. This suggests that employment losses are primarily concentrated in firms that subsequently file for bankruptcy and their frequency is similar to that in bankrupt firms where earnings manipulation is not an issue (Gilson 1989, 1990). For example, Gilson (1989) reports an average senior manager turnover rate of 52 percent among financially distressed firms compared to 19 percent in non-financially distressed firms. As such, if the manipulation of earnings was intended to delay bankruptcy proceedings, managers do not appear to be worse off from an employment standpoint.

I attempt to assess how the public discovery of the financial manipulations affects managers' reputation. I operationalize reputation as the ability to find a managerial position after being fired. I find that prospects for future employment are poorer for executives in firms that file for bankruptcy. Specifically, I find that 27 percent of officers who resign or are fired from bankrupt firms secure future employment whereas the corresponding percentage is 39 percent for non-bankrupt firms. While employment losses are likely associated with a decline in managers' reputation, it appears that such a decline arises from financial distress rather than from earnings manipulation. This finding should be interpreted with caution because compensation details for subsequent employment are not available and the subsequent employment data are unlikely to be complete. That is, name searches yield multiple matches, but without access to social security numbers, it is not possible to track individual officers' future employment. The reported statistics come from instances where data sources indicated that the officer was formerly employed by a sample firm.

SEC Sanctions

I examine the frequency and outcome of SEC sanctions against managers charged with GAAP violation who profit from trading in the violation period. When the SEC charges managers with fraudulent earnings overstatement, I expect such managers to be brought up on charges of illegal trading and to be required to disgorge trading profits and pay penalties.

Table 7, panel A, reports that all 74 managers charged with GAAP violation by the SEC for which insider trading data are available are net sellers and that the SEC only imposes monetary sanctions on 28 of these 74 managers (37.8 percent). Panel A also reports that managers in firms that overstate earnings in the context of a security offering are significantly more likely (82.2 percent) to be subject to SEC profit disgorgement actions relative to managers in firms not issuing equity (10.9 percent). While not all managers charged with GAAP violation are sanctioned by the SEC, panel B reports the estimated gains for trading in the violation period are higher for sanctioned managers, suggesting, if

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[30] Abelson (1996, section 3, 1) suggests that when managers are "manipulating a company's financial numbers to mislead investors, the punishment is often anything but sharp or swift." The anecdotal evidence in the article suggests that such behavior rarely leads to dismissals.

TABLE 7
Frequency and Outcome of SEC Sanctions for Profit Disgorgement and/or Payment of Penalties for Trading in the Violation Period Against Managers Charged with GAAP Violation[a]

Panel A: Frequency of SEC Actions

	n	*Number Sanctioned by SEC*[a]	*%*
Managers charged with GAAP violation	74[e]	28	37.8
Subset of Managers charged in firms that issue securities	28	23	82.2
Subset of Managers charged in firms that do not issue securities	46	5	10.9
p-value Binominal proportions test[c]			.01

Panel B: Estimated Gains and Penalties to Trading by Managers Charged by the SEC with GAAP Violation

		Mean (Median) in Millions				
	n	*"As-if" Prices are Market-Adjusted*[d]	*"As-if" Prices are Risk-Adjusted*[d]	*"As-if" Prices Adjusted by Price Loss (−1,+1)*[d]	*SEC Monetary Sanctions Assessed*[e]	*Actual Recovery by SEC*[e]
Managers sanctioned	28	2.44 (.40)	3.66 (.30)	1.24 (.21)	6.49 (.70)	4.36 (.48)
Managers not sanctioned	46	1.78 (.30)	2.04 (.32)	1.26 (.14)	.00 .00	.00 .00
p-value Wilcoxon Rank-Sum Test[f]		.05	.05	.05		

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[a] Data on SEC actions against firms and managers come from: (1) SEC's litigation releases and AAERs, (2) the following libraries in Lexis/Nexis: OMNI (contains court decisions, SEC releases), CLSDRV (class-action and shareholder derivative litigation), and ALLNWS (news items from various sources).

[b] Managers are charged by the SEC with GAAP violation in AAERs or in SEC court filings in criminal actions joint with the Department of Justice. All 74 managers charged with GAAP violation for which insider trading data are available are net sellers in the violation period. That is, for these managers proceeds from transactions in the violation period (computed as value received for shares sold less value disbursed for shares purchased) are positive.

[c] Tests of the null hypothesis that the proportion of managers sanctioned by the SEC is the same in firms that issue securities and in firms that do not.

[d] Gains are estimated by using three methods of computing "as if" or corrected prices (P_{kit}). On a per-share basis, the gain accruing to firm i's insiders is the difference between the price at which a transaction occurs on a day t (P_{it}) and a corrected or "as if" price (P_{kit}). Assuming that the firm i's price on day +1, the day after the announcement (P_{i1}) is a "true" price, the following three computations of "as if" prices are made:

(*Continued on next page*)

TABLE 7 (Continued)

(a) Market adjusted: $P_{ict} = P_{i1}\left(\prod_{\tau=t}^{1}(1 + R_{m\tau})\right)^{-1}$

(b) Risk adjusted: $P_{ict} = P_{i1}\left(\prod_{\tau=t}^{1}(1 + \hat{\alpha}_i + \hat{\beta}_i R_{m\tau})\right)^{-1}$

(c) Adjusted for price loss (−1, +1) : $P_{ict} = P_{it} -$ Price loss_i (−1, +1)

where $R_{m\tau}$ is the market return on day τ, $\hat{\alpha}_i$ and $\hat{\beta}_i$ are market model reestimated every 200 days and used to compute expected returns for the next 200 days. I require a minimum of 100 trading days of data within a 200-day period. When the minimum is not met, I set the estimates of α and β at zero and 1, respectively. Realized gains are computed as follows: Realized Gains $= \sum_i \sum_t SEC_{it}(P_t - P_{ict})$ where i spans all firms and t all transaction dates, SEC is the number of secondary shares, P_{it} is the offer price (on day t), and P_{ict} is the "as-if" or corrected price on day t.

[e] The data are from the same sources as note a. Unless the source indicates that the assessed amount is waived because of the accused financial situation, it is assumed to be recovered.

[f] Tests of the null hypotheses that estimated gains, are the same for managers charged by the SEC with GAAP violation whether sanctioned or not.

these gains are reliable estimates of managers' trading profits, that the SEC focuses on managers with larger illegal trading profits.[31]

Sanctioned managers suffer monetary losses as the SEC assesses penalties on managers totaling $181 million, consisting of $136 million for profit disgorgement and $45 million in pre-judgment interest and civil penalties. The SEC only recovers $122 million because it waives disgorgement and penalties based on the accused's financial condition,[32] but the average actual recovery ($4.36 million) is systematically greater than the average gain in the three estimation methods ($1.24 to 3.66 million). The SEC appears to pursue managers who defraud investors in the context of security offerings. Managers charged with fraud in the context of security offerings account for 97.6 percent of the amount recovered by the SEC. This is not surprising because such investigations are typically joint with the FBI and, deputized by the Department of Justice, the SEC often brings criminal actions against managers. Indeed, all 16 of the sample managers who receive jail sentences (actual or suspended) are charged in the context of security offerings and prohibited from serving as directors or officers of firms registered with the SEC.

The preceding evidence suggests that sanctioned managers suffer monetary losses. They also suffer reputation losses; they are more likely to be fired (20 of 28 or 71.4 percent) compared to managers charged but not sanctioned (34.0 percent) and my searches reveal that none of the sanctioned managers who are fired either find subsequent employment or serve on a board of directors. However, since the SEC tends not to impose sanctions on managers unless the overstatement occurs in the context of a security offering, the evidence is relevant to the long-standing policy debate about the prohibition of informed insider trading. My results suggest that neither the employment nor the monetary penalties claimed by proponents of insider trading to inhibit insiders from taking advantage of outsiders during periods of declining performance appear to be strong or effective enough for the cases of extreme earnings manipulation examined in this paper.

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[31] Gains are estimated using three methods commonly used in litigation research (see Beaver et al. 1994; Francis et al. 1994). The method in Table 7, Panel B, column 1 adjusts for market-wide movements and that in column 2 also adjusts for risk. These so-called backward indexing methods fail to take into account other firm-specific or industry-wide events that influence stock prices before the public discovery of violation. The method in column 3 addresses this problem as it implicitly assumes that the firm price series is perfectly correlated with an index for all days prior to the announcement (see Beaver et al. 1994). Subtracting the price loss in days −1 to +1 from violation period prices (adjusted for stock splits and stock dividends) yields a corrected price series that implicitly controls for market, industry, and firm-specific influences.

[32] For example, AAER No. 383 (Coated Sales, Inc.) states: "Weinstein was ordered to disgorge $16,860,089 representing profits received as a result of his illegal conduct alleged in the complaint, and a civil penalty of $16,860,089 pursuant to the Insider Trading Sanctions Act of 1984 ("ITSA"); Bloom was ordered to disgorge $141,300 and a civil penalty of $141,300, pursuant to ITSA; and Davis was ordered to disgorge $17,000 and a civil penalty of $17,000, pursuant to ITSA. Disgorgement and payment of the penalties was *waived*, based upon each of the defendant's financial condition" (emphasis added) (*Federal Securities Law Reporter*, 63, 079).

V. CONCLUSION

This study investigates incentives and penalties related to earnings overstatement and contains the following results. First, relative to managers in control firms, managers in firms that overstate earnings are more likely to sell their equity holdings and cash-in their equity-contingent compensation prior to the public discovery of the overstatement. The stock market analysis suggests that shareholders suffer significant wealth losses on discovery, and, assuming that litigation costs against firms are accurately estimated, the evidence suggests that overstatement leads to inflated prices. Second, I find that managers' employment losses subsequent to discovery are similar in firms that overstate earnings and firms that do not. Third, I find that the SEC tends not to impose trading sanctions on managers it charges with earnings overstatement and who profited from selling their own equity in the violation period, unless the overstatement occurs in the context of a security offering.

Interpreting the results in this study requires three caveats. First, the sample likely consists of the upper tail of the distribution of firms that overstate earnings and the results should be interpreted in this light. Second, the empirical tests assess only whether there is an association between managers' trading behavior and earnings overstatement. Third, since the observed results could reflect not only managers' trading incentives but also the SEC investigation process, the interpretation assumes that the research design controls for how SEC scrutinizes firms.

Given these caveats, the results suggest that managers' desire to sell their equity contingent wealth at higher prices is a motivation for earnings overstatement. The evidence that managers benefit from trading suggests that their trading behavior is worthy of investigation in future research. A potential implication arises because prior research has been unable to distinguish whether managers' discretionary accounting choices are driven by opportunism or their desire to reveal to investors their expectation about the firm's future cash flows (see Holthausen [1990] and Guay et al. [1996] for discussions). To the extent that managers act as informed traders, their trading behavior signals their expectation about firm performance, and I expect the signal to be consistent with the direction in which they exercise discretion over accruals. Thus, correlating estimates of managers' discretion over accruals with the volume and direction of changes in managers' trading activity may be informative about whether earnings management is intended to mislead or to provide information.

The findings may also contribute to a long-standing policy debate because proponents of insider trading argue that nontrade incentives such as compensation from continued and future employment prevent insiders from profiting from corporate failure. However, the results suggest that these implicit incentives may not be completely effective in firms with declining performance.

REFERENCES

Abelson, R. 1996. Truth or consequences? Hardly. *New York Times* (June 23): Section 3, 1.

Abowd, J. M., and H. S. Farber. 1982. Job queues and the union status of workers. *Industrial and Labor Relations Review* 35 (April): 354–367

Arshadi, N., and T. H. Eyssell. 1993. *The Law and Finance of Corporate Insider Trading: Theory and Evidence.* Boston, MA: Kluwer Academic Publishers.

Barry, C. B., and S. J. Brown. 1984. Differential information and the small firm effect. *Journal of Financial Economics* 13 (June): 283–294.

Beasley, M. S. 1996. An empirical analysis of the relation between board of director composition and financial statement fraud. *The Accounting Review* 71 (July): 443–465.

Beatty, A., S. Chamberlain, and J. Magliolo. 1995. Managing financial reports of commercial banks: The influence of taxes, regulatory capital, and earnings. *Journal of Accounting Research* 33 (Autumn): 231-261.

Beaver, W. H., J. K. Malernee, and M. C. Keeley. 1994. Potential damages facing auditors in security fraud cases. In *Accountants' Liability: The Need for Fairness,* edited by J. T. Behrendt, R. Clegg, and R. L. Weigel. The National Legal Center for the Public Interest.

Beneish, M. D., and E. Press. 1993. Costs of technical violation of accounting-based debt covenants. *The Accounting Review* 68 (April): 233–257.

———, and ———. 1995. The resolution of technical default. *The Accounting Review* 70 (April): 337–353.

———. 1997. Detecting GAAP violation: Implications for assessing earnings management among firms with extreme financial performance. *Journal of Accounting and Public Policy* 16 (Fall): 271–309.

Carlton, D., and D. Fischel. 1983. The regulation of insider trading. *Stanford Law Review* 35 (May): 857–895.

Collins, J. H., D. A. Shackelford, and J. M. Wahlen. 1995. Bank differences in the coordination of regulatory capital, earnings and taxes. *Journal of Accounting Research* 33 (Autumn): 263–291.

Dalley, P. J. 1998. From horse trading to insider trading: The historical antecedents of the insider trading debate. *William and Mary Law Review* 39 (4): 1289–1354.

Dechow, P. M., R. G. Sloan, and A. P. Sweeney. 1995. Detecting earnings management. *The Accounting Review* 70 (April): 193–225.

———, ———, and ———. 1996. Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the SEC. *Contemporary Accounting Research* 13 (Spring): 1–36.

Dopuch, N., R. W. Holthausen, and R. W. Leftwich. 1987. Predicting audit qualifications with financial and market variables. *The Accounting Review* 62 (July): 431–454.

Dye, R. 1984. Insider trading and incentives. *Journal of Business* 53 (July): 295–313.

Federal Securities Law Reporter nd. Chicago, IL: Commerce Clearing House, Inc.

Feroz, E. H., K. Park, and V. S. Pastena. 1991. The financial and market effects of the SEC's accounting and auditing enforcement releases. *Journal of Accounting Research* 29 (Supplement): 107–148.

Francis, J., D. Philbrick, and K. Schipper. 1994. Determinants and outcomes in class action securities litigation. Working paper, University of Chicago.

Fridson, M. S. 1991. *Financial Statement Analysis: A Practitioner's Guide.* New York, NY: John Wiley.

Friedlan, J. M. 1994. Accounting choices of issuers of initial public offerings. *Contemporary Accounting Research* 11 (Summer): 1–31.

Gilson, S. C. 1989. Management turnover and financial distress. *Journal of Financial Economics* 25 (2): 241–262.

———. 1990. Bankruptcy, boards, banks and blockholders. *Journal of Financial Economics* 26 (October): 355–387.

———, and M. R. Vetsuypens. 1993. CEO compensation in financially distressed firms: An empirical analysis. *Journal of Finance* 48 (May): 425–458.

Guay, W. A., S. P. Kothari, and R. L. Watts. 1996. A market-based evaluation of discretionary-accrual models. *Journal of Accounting Research* 34 (Supplement): 83–105.

Holthausen, R. W. 1990. Accounting method choice. *Journal of Accounting and Economics* 12 (January): 207–218.

Jaffe, J. F. 1974. Special information and insider trading. *Journal of Business* 47 (July): 410–428.

John, K., and L. H. P. Lang. 1991. Insider trading around dividend announcements: Theory and evidence. *Journal of Finance* 46 (September): 1361–1389.

Jones, J. 1991. Earnings management during import relief investigations. *Journal of Accounting Research* 29 (Autumn): 193–228.

Kile, C. 1996. An analysis of the SEC's review program: Does the SEC target bad news? Working paper, Emory University.

Leland, H. E., and D. H. Pyle. 1977. Informational asymmetries, financial structure, and financial intermediation. *Journal of Finance* 32 (May): 371–387.

Lev, B., and M. de Villiers. 1994. Stock price crashes and rule 10(b)-5 damages: A legal, economic, and policy analysis. *Stanford Law Review* 47 (November): 7–37.

Loebbecke, J. K., M. M. Eining, and J. J. Willingham. 1989. Auditor's experience with material irregularities: Frequency, nature, and detectability. *Auditing: A Journal of Practice & Theory* 9 (Fall): 1–28.

Loughran, T., and J. R. Ritter. 1997. The operating performance of firms conducting seasoned equity offerings. *Journal of Finance* 52 (December): 1823–1850.

Maddala, G. S. 1983. *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge, MA: Cambridge University Press.

Manne, H. 1966. *Insider Trading and the Stock Market*. New York, NY: Free Press.

Moyer, S. 1990. Capital adequacy ratio regulations and accounting choices in commercial banks. *Journal of Accounting and Economics* 13 (July): 123–154.

National Association of Certified Fraud Examiners. 1993. *Cooking the Books: What Every Accountant Should Know about Fraud*. New York, NY: NASBA.

National Commission on Fraudulent Financial Reporting. 1987. *Report of National Commission on Fraudulent Financial Reporting*. New York, NY: AICPA.

Neter, J., W. Wasserman, and M. Kutner. 1989. *Applied Linear Regression Models*. 2nd edition. Homewood, IL: Irwin.

Noe, T. H. 1997. Insider trading and the problem of corporate agency. *Journal of Law, Economics, and Organization* 13 (October): 287–318.

Palmrose, Z-V. 1999. *Empirical Research on Auditor Litigation: Considerations and Data*. Sarasota, FL: AAA.

Pincus, K., W. H. Holder, and T. J. Mock. 1988. *Reducing the Incidence of Fraudulent Financial Reporting: The Role of the Securities and Exchange Commission*. Los Angeles, CA: SEC Financial Reporting Institute of the University of California.

Provenz v. Miller, 102 F.3d 1478, 1491 (9th Cir. 1996).

Rangan, S. 1998. Earnings around seasoned equity offerings: Are they overstated? *Journal of Financial Economics* 50 (October): 101–122.

Scholes, M., G. Wilson, and M. Wolfson. 1990. Tax planning, regulatory capital planning, and financial reporting strategy for commercial banks. *Review of Financial Studies* 3: 625–650.

Searls v. Glasser, 64 F.3d 1061, 1068 (7th Cir. 1995).

Seyhun, H. N. 1986. Insider profits, costs of trading, and market efficiency. *Journal of Financial Economics* 16 (June): 189–212.

———, and M. Bradley. 1997. Corporate bankruptcy and insider trading. *Journal of Business* 70 (April): 189–216.

Sloan, R. G. 1996. Do stock prices fully reflect information in accruals and cash flows about future earnings? *The Accounting Review* 71 (July): 289–315.

Standard & Poor's. 1984–1996. *Standard & Poor's Register of Corporations, Executives, and Directors*. New York, NY: Standard & Poor's Corporation.

Summers, S. L., and J. T. Sweeney. 1998. Fraudulently misstated financial statements and insider trading: An empirical analysis. *The Accounting Review* 73 (January): 131–146.

Teoh, S. H., I. Welch, and T. J. Wong. 1998a. Earnings management and the long-term underperformance of initial public offerings. *Journal of Finance* 53 (December): 1935–1974.

———, ———, and ———. 1998b. Earnings management and the post-issue underperformance of seasoned equity offerings. *Journal of Financial Economics* 50 (October): 63–99.

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The Explanatory Power of Earnings Levels vs. Earnings Changes in the Context of Executive Compensation

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ABSTRACT: Studies in the capital market context indicate that earnings changes and earnings levels considered jointly provide a more comprehensive representation of unexpected earnings than either earnings changes or earnings levels considered alone. Recent studies of executive compensation demonstrate that executive compensation revisions are greater when earnings innovations are permanent, than when innovations are transitory. Together, these literatures imply that both earnings changes and earnings levels explain revisions to CEO compensation. Specifically, formal analysis implies that weights on earnings *changes* vary directly with the persistence of earnings innovations and that weights on earnings *levels* vary directly with persistence for low persistence observations and inversely with persistence for high persistence observations. Evidence for compensation to 712 executives of U.S. corporations is consistent with these expectations. Such results suggest that earnings levels, earnings changes, and earnings persistence need to be considered when investigating relations between accounting earnings and executive compensation.

Key Words: *Executive compensation, Accounting earnings, Earnings persistence.*

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I. INTRODUCTION

The notion that reported earnings have both permanent and transitory components is now well documented. Studies of the role of earnings in the capital market context establish that the persistence of earnings innovations has direct implications with respect to the information content and value relevance of accounting earnings (Kormendi and Lipe 1987; Collins and Kothari 1989; Ali and Zarowin 1992a, 1992b). Results reported in these studies indicate that security values assign greater weight to persistent, than to transitory, earnings innovations. Researchers are now beginning to consider the relevance of earnings persistence in the context of executive compensation (Gaver and Gaver 1998; Baber et al. 1998). In particular, Baber et al. (1998) find that permanent earnings innovations are weighted more heavily than transitory innovations in setting executive salary and bonus compensation. This finding, which is similar to the finding regarding earnings persistence in the capital market context, suggests an informed use of accounting earnings in managerial labor markets.

This study extends these investigations to consider how the persistence of earnings determines whether changes or levels is the appropriate specification of accounting earnings for investigating relations between compensation and earnings. The analysis parallels that of Easton and Harris (1991) and Ali and Zarowin (1992b) in the capital market context. These studies establish that both earnings changes and earnings levels are essential to achieve a comprehensive representation of the role of earnings for explaining security returns. In particular, specifications that include only earnings changes fail to consider potentially important and value-relevant implications of earnings that are captured by including earnings levels.

The principal focus of this study is to ascertain whether the earnings changes vs. earnings levels distinction also manifests in associations between chief executive officer (CEO) compensation and accounting earnings. Aside from the relevance of the analysis to the theoretical issue of whether capital markets and labor markets respond to earnings innovations similarly, a practical motivation underlies our investigation. Specifically, estimates of the statistical properties of earnings—that is, estimates of whether earnings innovations are permanent or transitory—typically require long time series, and even when sufficient observations are available, there is no guarantee that estimates are stationary. Thus, following studies in the capital market context, prior investigations of executive compensation typically use earnings changes to consider compensation-earnings relations, the underlying assumption being that changes provide a parsimonious representation of earnings innovations.[1] Formal analysis provided in this paper indicates that earnings changes are a poor proxy for earnings innovations that contain transitory components. Thus, if earnings persistence determines the role of earnings for setting executive compensation, then empirical models are misspecified to the extent that current-period earnings innovations are transitory. Ali and Zarowin (1992a, 1992b) offer a similar observation in the capital market context, but we go beyond this to incorporate the result of Baber et al. (1998) that compensation revisions are increasing in the persistence of earnings innovations. More specifically, we posit that the sensitivity of compensation to earnings changes is an increasing, convex function of the persistence of earnings innovations. Ali and Zarowin (1992b) also predict that the weight on earnings levels decreases as earnings become more persistent.

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[1] Studies that use earnings changes (or a similar metric) to explain CEO compensation include Lambert and Larcker (1987), Jensen and Murphy (1990), Janakiraman et al. (1992), Clinch and Magliolo (1993), and Baber et al. (1996).

In contrast, our analysis indicates that weights assigned to earnings levels increase and then decrease as earnings innovations become more persistent. That is, the sensitivity of compensation to earnings levels is not monotonic, but rather is concave, in persistence.

Results for a cross-sectional investigation of 1992 and 1993 changes in compensation paid to chief executive officers (CEOs) of 712 U.S. corporations indicate that relations between changes in executive compensation and earnings changes vs. earnings levels conform to these expectations. Thus, our analyses suggest that earnings levels, earnings changes, and a measure of earnings persistence are essential to properly specify relations between CEO compensation and earnings performance. At the same time, the analyses imply an efficient use of earnings in contracting between managers and shareholders.

A discussion of the role of earnings in the context of executive compensation is in Section II. Data are described in Section III. Section IV describes the hypotheses and testing approach. The primary results are presented in Section V, and results for additional procedures which corroborate the primary results are presented in Section VI. Concluding remarks are in Section VII.

II. THE MODEL

We posit that the relation between compensation and earnings changes and earnings levels is predicated on the persistence of earnings innovations. To implement the concept of persistence, we adopt an IMA(1,1) time-series characterization of earnings, which is used frequently in the accounting literature, because it facilitates parsimonious empirical specifications of both unexpected accounting earnings and earnings persistence (Beaver 1970; Beaver et al. 1980; Ali and Zarowin 1992b). In particular, let X_t be period t earnings, and:

$$X_t - X_{t-1} = UE(X_t) - \theta UE(X_{t-1}) \tag{1}$$

where period t unexpected earnings $UE(X_t)$ are independently and identically distributed white noise random variables, and θ is a measure of the persistence of earnings innovations. More specifically, if $\theta = 0$, then earnings follow a random walk process, and all earnings innovations are expected to be permanent. In contrast, if $\theta = 1$, then earnings follow a mean reverting process, and all earnings innovations are expected to be transitory.[2] Thus, the parameter $0 < (1 - \theta) < 1$ varies directly with earnings persistence.[3]

Following Ali and Zarowin (1992b), we rearrange expression (1) and, assuming θ to be time-invariant, substitute iteratively for $UE(X_{t-1})$ to obtain:

$$UE(X_t) = X_t - (1 - \theta)X_{t-1} - \theta(1 - \theta)X_{t-2} - \theta^2(1 - \theta)X_{t-3}.... \tag{2}$$

Suppressing lagged terms in X beyond $t - 1$ and rearranging yields:

$$UE(X_t) = (1 - \theta)\Delta X_t + \theta X_t \tag{3}$$

where $\Delta X_t = (X_t - X_{t-1})$.

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[2] Note that both permanent and transitory earnings are value-relevant, although in the context of security prices, permanent earnings innovations are valued more highly. In particular, transitory earnings are not to be confused with price-irrelevant earnings components, for example, earnings that result from accounting manipulations. See Ramakrishnan and Thomas (1995) for a comprehensive treatment of the issues.

[3] An IMA(1,1) with $0 < \theta < 1$ characterization is typically advanced in the accounting literature, even though stationarity implies a wider range $-1 < \theta < 1$. The range $-1 < \theta < 0$ indicates a process that is more persistent than a random walk (i.e., one dollar of innovation today is expected to be followed by more than one dollar in future periods).

The useful feature of expression (3) is that, if earnings follow an IMA(1,1) process, then unexpected earnings can be expressed approximately as a linear combination of earnings changes and levels, where the relative contribution of earnings levels vs. earnings changes is determined by the parameter θ. Specifically, if the persistence of earnings innovations increases—that is, if $(1 - \theta)$ increases—then the weight on earnings changes increases, but the weight on earnings levels decreases.

Next we consider the compensation function. The evidence is that both security returns and accounting earnings are used to set compensation contracts (Lambert and Larcker 1987; Jensen and Murphy 1990; Baber et al. 1996). Such evidence, considered in the agency context, implies that both measures are informative of the agent's unobservable actions (Holmstrom 1982; Banker and Datar 1989). Related work suggests that the use of accounting earnings to measure performance shields executives from market-wide fluctuations in security returns that are beyond the executives' control (Sloan 1993).[4] Thus, following Lambert and Larcker (1987) and Baber et al. (1996), we specify CEO compensation as:

$$\Delta COMP_{i,t} = \alpha_0 + \alpha_1\, UE(R_{i,t}) + \alpha_2\, UE(X_{i,t}) + e_{i,t} \tag{4}$$

where $\Delta COMP_{i,t}$ is the period $t - 1$ to period t change in executive compensation of firm i, $UE(R_{i,t})$ is the period t unexpected common stock return, and $UE(X_{i,t})$ is the period t earnings innovation. The intuition behind expression (4) is that changes in compensation respond to unexpected performance.[5]

Baber et al. (1998) suggest additional restrictions on the parameter α_2 on $UE(X_{i,t})$ when persistent earnings innovations are weighted more heavily than transitory earnings innovations in determining CEO compensation. More formally, the parameter α_2 is an increasing function of $(1 - \theta)$:

$$\Delta COMP_t = \alpha_0 + \alpha_1\, UE(R_t) + [A + B(1 - \theta)]\, UE(X_t) + e_t \tag{5}$$

where firm subscripts are suppressed to ease the exposition, and where $A > 0$ and $B > 0$ indicate through the term $\alpha_2 = [A + B(1 - \theta)]$ that the sensitivity of compensation to earnings innovations increases linearly with earnings persistence $(1 - \theta)$.[6]

In general, although both permanent and transitory earnings innovations are rewarded, period t compensation varies directly with the extent that unexpected earnings are permanent. In this regard, notice how the term $[A + B(1 - \theta)]$ in expression (5) rewards permanent earnings innovations. If current period t earnings innovations are permanent (if

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[4] Baber et al. (1998) argue that the use of accounting earnings as performance indicators potentially generates another problem. Specifically, because accounting earnings do not incorporate the long-run consequences of current investment decisions, the use of accounting earnings to evaluate performance can exacerbate the "horizon problem" which results when manager decision makers discount earnings realized beyond their anticipated tenure with the firm (Smith and Watts 1982; Johnson 1987; Ittner et al. 1997). In contrast, capital markets properly value expected cashflows over an infinite horizon (Kormendi and Lipe 1987; Collins and Kothari 1989; Ali and Zarowin 1992a, 1992b), and therefore, the horizon problem is not likely to be an issue when security returns are used to evaluate performance. The horizon problem is particularly well documented with respect to investment in research and development (Dechow and Sloan 1991; Baber et al. 1991; Perry and Grinaker 1994; Bushee 1998).

[5] The dependent variable derived formally in Lambert and Larcker (1987) is changes in compensation to the kth power. The authors note that, empirically, k is not reliably different than 1 for nearly three-quarters of the firms in their sample.

[6] We assume that weights on unexpected earnings vary linearly with earnings persistence in order to simplify the presentation. A more general characterization where, for example, the relation can be nonlinear complicates the analysis without offering useful insight.

$\theta = 0$), then period t compensation increases (A + B) for each unit of unexpected earnings. In contrast, if current earnings innovations are transitory (if $\theta = 1$), then period t compensation increases by A for each unit of unexpected period t earnings. Thus, the parameter B can be interpreted as the incremental period t compensation for generating a unit of permanent, rather than transitory, earnings innovations. Assuming reasonable discount rates, we expect that $B > A$. It can be shown that, if earnings equal cash flows which follow an IMA(1,1), and if the discounted value of expected earnings in each future period is equally weighted (dollar-for-dollar) in executive compensation, then $A > 0$ and $B = A/r$, where r is the equity discount rate. Such conditions may not hold exactly in practice, yet we expect that period t compensation varies with the extent that unexpected earnings are permanent.

To focus on the role of earnings levels and earnings changes, we substitute expression (3) for $UE(X_t)$ in expression (5) to obtain:

$$\begin{aligned}\Delta COMP_t = {} & \alpha_0 + \alpha_1\, UE(R_t) + [A(1-\theta) + B(1-\theta)^2]\,\Delta X_t \\ & + [A + (B - A)(1-\theta) - B(1-\theta)^2]\,X_t + e_t.\end{aligned} \tag{6}$$

Consider the weights $[A(1 - \theta) + B(1 - \theta)^2]$ and $[A + (B - A)(1 - \theta) - B(1 - \theta)^2]$ on ΔX_t and X_t, respectively. If compensation committees understand the extent of the permanent/transitory composition of earnings innovations, and if they value the persistence of earnings innovations when setting executive compensation, then weights assigned to both earnings levels and earnings changes are a function of $(1 - \theta)$. Note that if earnings are entirely transitory, then $(1 - \theta) = 0$, and no weight is given to earnings changes and the weight given to earnings levels is positive. As $(1 - \theta)$ increases, the weight placed on earnings changes increases. In particular, notice that $\partial[A(1 - \theta) + B(1 - \theta)^2]/\partial(1 - \theta) = [A + 2B(1 - \theta)] > 0$, which means that weights assigned to earnings changes are an increasing, convex function of $(1 - \theta)$ over its feasible range.

The role of earnings levels is not so straightforward. To see this, consider how $\partial[A + (B - A)(1 - \theta) - B(1 - \theta)^2]/\partial(1 - \theta) = [(B - A) - 2B(1 - \theta)]$ changes for $B > 0$ and $(B - A) > 0$, conditions assumed in the derivation of expression (5). If $(1 - \theta) = 0$ such that earnings innovations are entirely transitory, then $\partial(\cdot)/\partial(1 - \theta) = [(B - A)] > 0$; but if $(1 - \theta) = 1$ such that earnings innovations are entirely permanent, then $\partial(\cdot)/\partial(1 - \theta) = [-(B + A)] < 0$. Moreover, notice that the coefficient $[A + (B - A)(1 - \theta) - B(1 - \theta)^2]$ on earnings levels increases, and then decreases as $(1 - \theta)$ increases. Thus, the weight on earnings levels is concave in persistence. In particular, the weight increases in the range $0 < (1 - \theta) < (B - A)/2B$ and then decreases in the range $(B - A)/2B < (1 - \theta)$. If earnings innovations are entirely permanent, then the weight on earnings levels is zero.

III. DATA AND SAMPLE SELECTION

Data are those used in Baber et al. (1998). Financial information is from the 1993 Compustat files, and CEO compensation information is from 1992 and 1993 proxy statements for 1,837 publicly traded U.S. firms where the CEO serves two consecutive full years during the 1991–1993 period. Eliminating firms that lack earnings or other financial data and firms where estimates of θ do not converge (see below) leaves 712 firms with usable data for at least one year. Excluding outliers, using procedures described later, yields a maximum of 1,267 firm-year observations.

Table 1 summarizes selected characteristics of the sample firms for both years 1992 and 1993. Notice that the mean IMA parameter $(1 - \theta)$ is 0.858 for both years and the

TABLE 1
Characteristics of Firms Used in the Analysis

Panel A: Distributions of Sample Firms Across Industries[a]

Industry	*Number of Firms*
Basic industries	50
Capital goods	168
Construction	28
Consumer goods	245
Energy	38
Financial services	78
Transportation	25
Utilities	80
Total	712

	n	*Mean*	*Median*	*Std. Dev.*
Panel B: CEO Compensation ($thousands): Entries are for 1992/1993, respectively				
Total compensation	623/636	957/1,016	566/630	1,390/1,152
Cash salary plus bonus	634/650	614/655	466/500	475/533
Cash bonus	634/650	194/224	91/106	293/347
Changes as a fraction of the prior years' base salary:				
Total compensation	623/636	0.194/0.094	0.056/0.055	2.074/2.100
Cash salary plus bonus	634/650	0.125/0.092	0.050/0.035	0.597/0.547
Cash bonus	634/650	0.074/0.055	0.000/0.000	0.478/0.513
Panel C: Independent Variables				
Stock returns (RET)	634/650	0.183/0.169	0.118/0.092	0.450/0.498
Earnings levels[b] (X)	634/650	0.080/0.110	0.107/0.118	0.428/0.370
Earnings changes[b] (ΔX)	634/650	0.041/0.017	0.015/0.015	0.492/0.229
$(1 - \theta)$[c] (PERSIST)	634/650	0.858/0.858	0.857/0.855	0.298/0.301

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[a] Industry classifications are from Ali and Kumar (1994).

[b] Earnings is specified as earnings before extraordinary items (Compustat data item #18). Both earnings levels and changes are scaled by book value of equity at the beginning of the year t.

[c] Earnings persistence $(1 - \theta)$ is computed once for each firm using $\Delta X_t = UE(X_t) - \theta UE(X_{t-1})$, where X_t is year t earnings per share. Differences between the 1992 and 1993 distributions for $(1 - \theta)$ indicate differences in the composition of the sample, not year-to-year differences in the estimate for each firm.

median is 0.857 for 1992 and 0.855 for 1993, which implies θ approximately equal to the 0.15 estimate reported in Ali and Zarowin (1992a).[7] For both years combined, the interquartile range for the distribution of $(1 - \theta)$ estimates is (0.66; 1.06) and fewer than 10 percent of the estimates are less than 0.50 (not reported in the table).

IV. EMPIRICAL SPECIFICATION

Next consider regression specifications designed to investigate the role of earnings changes vs. earnings levels on executive compensation. Substituting the empirical measure PERSIST = $(1 - \theta)$ and RET = common stock returns as the proxy for unexpected security returns UE(R) in expression (6) yields:

$$\begin{aligned}\Delta COMP_t = {} & \alpha_0 + \alpha_1\, RET_t + A\,[PERSIST * \Delta X_t] + B\,[(PERSIST)^2 * \Delta X_t] \\ & + A\, X_t + (B - A)\,[PERSIST * X_t] - B\,[(PERSIST)^2 * X_t] + e_t \qquad (7)\end{aligned}$$

where:

$\Delta COMP_t$ = year t − 1 to year t change in CEO cash (salary plus bonus) compensation deflated by year t − 1 base salary;[8]

RET_t = year t (raw) common stock return;

X_t = year t net income before extraordinary items (Compustat data item #18) deflated by the beginning-of-the-year book value of stockholders' equity (Compustat data item #60);

ΔX_t = year t − 1 to year t *change* in net income before extraordinary items (Compustat data item #18) deflated by beginning-of-the-year book value of stockholders' equity (Compustat data item #60);

PERSIST = earnings persistence $(1 - \theta)$ estimated using expression (1), at least 12 observations of annual earnings per share before extraordinary items (Compustat item #58), and a FORTRAN IMSL MAMME iterative nonlinear estimation procedure.

Following Lambert and Larcker (1987), we use raw common stock returns RET as a proxy for unexpected security returns UE(R).[9] Note that estimates of θ vary *inversely* with earnings persistence, and therefore, we use $(1 - \theta)$ as a measure of PERSIST to obtain empirical measures that vary directly. Finally, evidence in Baber et al. (1998) indicates that the persistence of earnings innovations is irrelevant to stock-based compensation components. Thus, we address changes in cash compensation, ignoring stock-based compensation components such as stock options and restricted stock.[10]

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[7] The IMA parameter θ is estimated using a FORTRAN IMSL MAMME iterative nonlinear estimation procedure. We require at least 12 time-series observations, which results in a 30.1 percent reduction in the sample size. Stationarity implies $-1 < \theta < 1$. An additional 12 percent of the sample is eliminated when empirical estimates of θ do not converge in this range.

[8] Compensation in any period potentially includes a performance-contingent component. Hence, deflating by the base salary, rather than by total compensation, not only controls for size-related factors that vary cross-sectionally, but also minimizes the effect of period t − 1 performance on the compensation metric (Baber et al. 1996). Results are comparable for specifications of changes in undeflated compensation measures, adjusted for heteroscedasticity using procedures described in White (1980).

[9] Results (not reported) are comparable for risk-adjusted, market-adjusted, and industry-adjusted common stock return specifications of UE(R).

[10] We verify that relations between stock-based compensation components and accounting earnings are not affected by persistence.

The complete empirical specification is:

$$\begin{aligned} \Delta COMP_t = {} & \beta_0 + \beta_1 RET_t + \beta_2 \Delta X_t + \beta_3 X_t + \beta_4 \Delta X_t{*}PERSIST \\ & + \beta_5 X_t{*}PERSIST + \beta_6 PERSIST + \beta_7 \Delta X_t{*}[PERSIST]^2 \\ & + \beta_8 X_t{*}[PERSIST]^2 + \beta_9 [PERSIST]^2 + e_t \end{aligned} \tag{8}$$

where β_i, $(i = 0,\ldots,9)$ = parameters to be estimated, and where other variables are defined, and all variables are scaled, as in expression (7).

Many prior studies of changes in CEO compensation omit earnings levels. Thus, the primary focus of the analysis is on the role of earnings levels and how that role depends on the persistence of earnings innovations. Our formal analysis of the issue indicates the following four relations in particular. First, we posit a convex relation between compensation changes and earnings changes such that the weight assigned to earnings changes increases in persistence, which implies $\beta_7 > 0$. Second, we posit a concave relation between compensation changes and earnings levels, which implies $\beta_8 < 0$. Third, if permanent earnings innovations are compensated more than transitory innovations, then we expect $\beta_5 = (B - A) > 0$. Finally, we expect positive compensation revisions for transitory earnings, which implies $\beta_4 = A > 0$. Notice that the variables ΔX, PERSIST, $[PERSIST]^2$ do not follow from expression (7). The motive for including these variables is to ensure that relations for the variables of interest cannot be attributed to unanticipated, potentially confounding factors not considered by our theory.[11] For example, including ΔX and $[PERSIST]^2$ addresses the possibility that relations for the interaction $\Delta X{*}[PERSIST]^2$ are attributable to main effects. We therefore offer no predictions for estimates of β_2, β_6, and β_9.

V. PRIMARY RESULTS

Results for specifications of expression (8) are in Table 2. The *main effects only* specification, displayed in the first column of the table, indicates relations between compensation changes and earnings changes and levels when all terms involving persistence are excluded. This model is used to identify outliers for all reported specifications. In particular, 17 observations are omitted when "dffits" exceeds $2\sqrt{(p/n)}$, where p is the number of parameters in the model (which are four) and n = 1,284 is the number of observations (Belsley et al. 1980).

Results for the *main effects only* model indicate statistically significant positive weight on earnings changes ($t = 5.71$), but an insignificant weight on earnings levels ($t = -0.27$). These results are consistent with the relatively high average persistence $(1 - \theta) = 0.85$ for the sample. The insignificant estimate for earnings levels does not mean that earnings levels are irrelevant in determining compensation, however. In particular, the analysis indicates that the weight on earnings changes and/or earnings levels depends on the extent that earnings innovations are permanent or transitory. The relevance of earnings levels is evident from results displayed in the second and third columns where persistence is incorporated into the specification.

Results when earnings changes and levels interact linearly with PERSIST are displayed in the second column of Table 2, designated the *linear interaction* specification. This specification is incomplete in that the quadratic terms in $[PERSIST]^2$ are excluded and, therefore, does not permit consideration of whether relations between compensation revisions and

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[11] We verify that reported results are comparable when these variables are excluded.

TABLE 2
OLS Specifications of Change in Cash Salary and Bonus on Security Returns, Earnings Changes, and Earnings Levels Conditional on Earnings Persistence
(t-statistics in parentheses) (n = 1267)

Coefficient/Variable	*Main Effects Only*	*Linear Interaction*	*Quadratic Interaction*
β_0/intercept	0.040 (3.243)	−0.014 (−0.395)	0.031 (0.424)
β_1/security return RET	0.284 (9.483)	0.263 (8.642)	0.256 (8.353)
β_2/earnings change ΔX	0.399 (5.707)	0.032 (0.186)	0.541 (1.677)
β_3/earnings level X	−0.008 (−0.271)	0.149 (1.660)	−0.275 (−1.183)
β_4/earnings change * persistence ΔX*PERSIST	omitted	0.667 (2.679)	−1.289 (−1.247)
β_5/earnings level * persistence X*PERSIST	omitted	−0.239 (−2.297)	1.317 (1.698)
β_6/persistence PERSIST	omitted	0.068 (1.732)	−0.089 (−0.490)
β_7/earnings change * persistence^2 ΔX*[PERSIST]^2	omitted	omitted	1.521 (2.003)
β_8/earnings level * persistence^2 X*[PERSIST]^2	omitted	omitted	−1.128 (−2.059)
β_9/persistence^2 [PERSIST]^2	omitted	omitted	0.113 (1.045)
Adjusted R^2	0.118	0.125	0.127

Specification

$$\Delta COMP_t = \beta_0 + \beta_1 RET_t + \beta_2 \Delta X_t + \beta_3 X_t + \beta_4 \Delta X_t{*}PERSIST + \beta_5 X_t{*}PERSIST$$

$$+ \beta_6 PERSIST + \beta_7 \Delta X_t{*}[PERSIST]^2 + \beta_8 X_t{*}[PERSIST]^2 + \beta_9 [PERSIST]^2 + e_t$$

$\Delta COMP_t$ = year t − 1 to year t change in CEO cash (salary plus bonus) compensation deflated by year t − 1 base salary;

RET_t = year t (raw) common stock return;

X_t = year t net income before extraordinary items (Compustat data item #18) deflated by the beginning-of-the-year book value of stockholders' equity (Compustat data item #60);

ΔX_t = year t − 1 to year t *change* in net income before extraordinary items (Compustat data item #18) deflated by beginning-of-the-year book value of stockholders' equity (Compustat data item #60);

(*Continued on next page*)

TABLE 2 (Continued)

PERSIST = earnings persistence, $(1 - \theta)$ estimated using expression (1), at least 12 observations of annual earnings per share before extraordinary items (Compustat item #58), and a FORTRAN IMSL MAMME iterative nonlinear estimation procedure.

β_i, $(i = 0,...,9)$ = regression parameters;

e_t = error term.

Observations are omitted when "dffits" exceeds $2\sqrt{(p/n)}$, where p is the number of parameters in the model and n is the number of observations (Belsley et al. 1980). The "main effects only" model is used to identify outliers for all three specifications.

earnings changes and/or levels are nonlinear in earnings persistence. The specification does permit a determination of the extent that earnings levels explain cross-sectional differences in compensation revisions and whether the role of earnings levels is affected by earnings persistence. In particular, the estimate $\beta_3 = 0.149$ $(t = 1.660)$ on earnings level X and the estimate $\beta_5 = -0.239$ $(t = -2.297)$ on the interaction X*PERSIST suggest that earnings levels do play a significant role in determining compensation revisions that depend on the extent that earnings innovations are permanent or transitory. Moreover, the statistically significant positive estimate $\beta_4 = 0.667$ $(t = 2.679)$ on the earnings changes interaction ΔX*PERSIST indicates that, consistent with Baber et al. (1998), the weight assigned to earnings changes varies directly with the extent that earnings innovations persist. As a whole, results for the *linear interaction* specification indicate that earnings changes are increasingly important, and earnings levels become less important, as earnings innovations become more permanent than transitory.

Results for the complete specification, designated the *quadratic interaction* model, are displayed in the third column of Table 2. Estimates for this specification should be interpreted cautiously as regression diagnostics indicate severe multicollinearity. Thus, we restrict our interpretation to estimates that indicate whether the relations between compensation revisions and earnings metrics are nonlinear.[12] In particular, we focus on β_7, the coefficient on ΔX*[PERSIST]^2, and β_8, the coefficient on X*[PERSIST]^2. Notice first that the estimates $\beta_7 > 0$ and $\beta_8 < 0$ are statistically significant in the predicted direction (one-tailed $\alpha < 0.05$). Next, note that the results are generally consistent with the theoretical model displayed as expression (7). In particular, the statistically significant positive estimate $\beta_7 = 1.521$ $(t = 2.003)$ is consistent with the proposition that the sensitivity of CEO compensation to earnings changes is increasing and convex in persistence of earnings innovations. Furthermore, the statistically significant negative estimate $\beta_8 = -1.128$ $(t = -2.059)$ supports the premise that the sensitivity of CEO compensation to earnings changes is concave in persistence of earnings innovations.

Finally, results (not reported) for each year 1992 and 1993 are comparable to those reported in Table 2 for the pooled sample. As a whole, the evidence displayed in Table 2 supports the proposition that the persistence of earnings innovations determines relations between compensation changes and earnings changes and between compensation changes and earnings levels.

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[12] Correlations between earnings changes ΔX and the corresponding interactions ΔX*PERSIST and ΔX*[PERSIST]^2, and between earnings levels X and the corresponding interactions X*PERSIST and X*[PERSIST]^2, typically exceed 0.90. Despite this problem, we find stable and statistically significant estimates β_7 and β_8 on quadratic terms for alternative specifications where one or more of the main effects PERSIST and [PERSIST]^2 and/or the linear interactions ΔX*PERSIST and X*PERSIST are excluded.

VI. OTHER PROCEDURES

Additional analysis is designed to address three concerns. First, recent studies of the determinants of CEO compensation indicate that the relative weights assigned to accounting earnings vs. security returns depend on the extent that investment opportunities comprise firm value (Smith and Watts 1992; Gaver and Gaver 1993; Baber et al. 1996). Thus, we are concerned about whether the results in Table 2 are attributable to unspecified factors related to investment opportunities. Results (not reported) for specifications that include investment opportunities and interactions between investment opportunities and earnings levels and changes are comparable to those in Table 2, which implies that such factors do not drive relations that we attribute to the persistence of earnings innovations.[13]

Second, the variable PERSIST is central to the study, and thus, we consider alternative measures. We consider the variance ratio (VR) described in Cochrane (1988) and adapted to the analysis of earnings time series by Lipe and Kormendi (1994) and Kang et al. (1995). Following evidence in Collins and Kothari (1989) and Ali and Zarowin (1992b), we also consider earnings-price ratios and the magnitudes of earnings changes as proxies for persistence. Notice that these two measures can be computed annually, whereas both PERSIST and VR require long time series. Results reported in Table 2 are robust to the choice of the persistence measure.[14]

Finally, when deriving expression (5) from expression (4), we impose a linear relationship between persistence and the weight assigned to unexpected earnings. This tactic yields parsimonious regression models, but it also raises the issue of whether the primary results are attributable to misspecifications that result from ignoring second-order effects of persistence.

We address this possibility by executing a nonparametric procedure that accommodates potential nonlinear effects of earnings persistence. In particular, we partition the observations into 100 portfolios according to ranks of the earnings persistence measure PERSIST. The first portfolio includes observations where earnings time series are least persistent (that is, earnings are primarily transitory) and the 100th portfolio includes observations where the earnings history is most persistent (earnings are primarily permanent). For each partition, we then estimate δ_i's for the reduced model:

$$\Delta COMP_t = \delta_0 + \delta_1 RET_t + \delta_2 \Delta X_t + \delta_3 X_t + e_t \qquad (9)$$

where δ_i, $(i = 0,...,3)$ = regression parameters, and where other variables are defined, and all variables are scaled, as in expression (7). The persistence of earnings innovations is presumed to be similar within each portfolio—that is, the effect of persistence is assumed constant within each portfolio—and therefore, interactions with PERSIST are not included in expression (9).

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[13] The investment opportunities measure is computed for year t as a linear combination of (1) investment intensity computed as the year $t - 3$ to year $t - 1$ sum of capital expenditure plus research and development expense plus acquisition, all divided by the sum of year $t - 3$ to year $t - 1$ depreciation expense; (2) the year $t - 3$ to year $t - 1$ geometric mean annual growth rate of the market value of assets; (3) the market-to-book value of assets at the end of year $t - 1$; and (4) the ratio of year $t - 1$ research and development expense to total assets at the end of year $t - 1$ (Baber et al. 1996, 304).

[14] VR is computed as $(1/k)$ times the variance of k-differences deflated by the variance of first differences. This measure varies directly with the extent that earnings innovations are persistent, as opposed to transitory. The use of θ presumes an IMA(1,1) process, whereas VR imposes no such restriction. This feature favors the use of VR, but it is unclear whether VR dominates θ for short time-series. Notice that persistence measures other than θ do not permit straightforward consideration of quadratic relations. Thus, we execute these procedures for the linear interaction model only. To consider interactions when E/P is the persistence measure, we rank the observations according to E/P and use a dummy variable to distinguish the four extreme deciles from the intermediate deciles of the distribution (Ali and Zarowin 1992b).

Our analysis posits that the weight assigned to earnings changes varies directly with persistence. Thus, we expect that estimates δ_2 increase as we move from portfolio 1 to portfolio 100. Table 3 displays results for analyses that address these expectations. Notice that Spearman correlations between persistence and estimates δ_2 for earnings changes are positive and statistically significant ($\alpha < 0.01$), which indicates the weights assigned to earnings changes increase as earnings innovations become more persistent. The correlation between δ_3 and persistence is negative but not statistically significant for conventional confidence levels. The absence of a statistically significant correlation likely arises because the weight on earnings levels is not monotonic in persistence. Finally, observe that comparing expression (6) with expression (9) indicates that $\delta_2 = A(1 - \theta) + B(1 - \theta)^2$ and $\delta_3 = A + (B - A)(1 - \theta) - B(1 - \theta)^2$. Thus, the sum $(\delta_2 + \delta_3)$ of the coefficients on earnings changes ΔX and earnings levels X equals $A + B(1 - \theta)$, which varies directly with persistence $(1 - \theta)$. We also find that the correlation between persistence and the sums $(\delta_2 + \delta_3)$ is positive and statistically significant, which implies that the overall importance of accounting earnings increases with the persistence of earnings innovations. These results reinforce our interpretations of the evidence displayed in Table 2.

VII. CONCLUDING REMARKS

Easton and Harris (1991) and Ali and Zarowin (1992b) establish that, if earnings innovations have transitory components, then both earnings changes and earnings levels are

TABLE 3
Spearman Correlations Between Earnings Persistence (1 − θ) Ranks and Estimates δ_i from 100 Regressions of Changes in Salary and Bonus on Security Returns, Earnings Levels and Earnings Changes
(n = 100)

Specification: $\Delta COMP_t = \delta_0 + \delta_1 RET_t + \delta_2 \Delta X_t + \delta_3 X_t + e_t$

security returns (δ_1)—predicted sign: ?	−0.19 (0.06)
earnings changes (δ_2)—predicted sign: +	0.30 (<0.01)
earnings levels (δ_3)—predicted sign: ?	−0.13 (0.19)
sum of earnings changes and levels ($\delta_2 + \delta_3$)—predicted sign: +	0.18 (0.07)

Entries in this table are computed as follows. Observations are ordered according to persistence (1 − θ), and then are partitioned into 100 equal portfolios with lowest persistence (transitory earnings innovations) observations assigned to the first portfolio and highest persistence (permanent earnings innovations) observations assigned to the 100th portfolio. Parameters (δ_i) are estimated for each portfolio using the specification displayed above. Entries are correlations between the 100 ordered-partition ranks and the corresponding 100 parameter estimates. The statistical significance (two-tailed p-value) of the correlation is displayed parenthetically.

required to achieve a more comprehensive empirical specification of relations between unexpected accounting earnings and security returns. Our objective is to determine whether this characterization applies in the context of executive compensation. Analyses of compensation paid to CEOs of 712 publicly traded U.S. companies indicate that earnings levels and earnings changes considered jointly provide an appropriate specification for considering relations between accounting earnings and executive compensation. More specifically, we find that weights assigned to earnings changes are convex and increasing, and weights assigned to earnings levels are concave—that is, first increasing and then decreasing—as earnings innovations become more persistent. Furthermore, we find that the role of earnings levels manifests only when persistence is considered. These results are consistent with the proposition that persistence is a factor in determining the relation between executive compensation and accounting earnings.

From a practical perspective, the analysis facilitates informed evaluations of empirical studies that consider relations between compensation and accounting earnings. In particular, the evidence indicates that specifications that include either earnings changes or earnings levels, but not both changes and levels, can be incomplete. Moreover, the consequences of omitting either measure depends on the extent that current earnings innovations are permanent vs. transitory.

At one level, the study sharpens our understanding of how accounting performance contributes toward the resolution of conflicts that arise from the separation of ownership and control. At another level, the study offers an alternative test of the permanent vs. transitory characterization of accounting earnings. More specifically, the proposition that the persistence of earnings innovations is reflected in capital markets, and the use of accounting earnings changes and levels to investigate persistence, is now generally accepted. Evidence that the changes-vs.-levels distinction also predicts well in the managerial labor market suggests that the characterization applies more generally.

REFERENCES

Ali, A., and P. Zarowin. 1992a. Permanent vs. transitory components of annual earnings and estimation error in earnings response coefficients. *Journal of Accounting and Economics* 15 (2/3): 249–264.

———, and ———. 1992b. The role of earnings levels in annual earnings-returns studies. *Journal of Accounting Research* 30 (2): 286–296.

———, and K. Kumar. 1994. The magnitudes of financial statement effects and accounting choice: The case of the adoption of SFAS 87. *Journal of Accounting and Economics* 18 (1): 89–115.

Baber, W., P. Fairfield, and J. Haggard. 1991. The effect of concern about reported income on discretionary spending decisions: The case of research and development. *The Accounting Review* 66 (4): 818–829.

———, S. Janakiraman, and S. Kang. 1996. Investment opportunities and the structure of executive compensation. *Journal of Accounting and Economics* 21 (3): 297–318.

———, S. Kang, and K. Kumar. 1998. Accounting earnings and executive compensation: The role of earnings persistence. *Journal of Accounting and Economics* 25 (2): 169–193.

Banker, R., and S. Datar. 1989. Sensitivity, precision, and linear aggregation of signals for performance evaluation. *Journal of Accounting Research* 27 (1): 21–39.

Beaver, W. 1970. The time series behavior of earnings variables. *Journal of Accounting Research* 9 (Supplement): 62–99.

———, R. Lambert, and D. Morse. 1980. The information content of security prices. *Journal of Accounting and Economics* 2: 3–28.

Belsley, D., E. Kuh, and R. Welsch. 1980. *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. New York, NY: Wiley.

Bushee, B. 1998. The influence of institutional investors on myopic R&D investment behavior. *The Accounting Review* 73 (3): 305–333.

Clinch, G., and J. Magliolo. 1993. CEO compensation and components of earnings in bank holding companies. *Journal of Accounting and Economics* 16 (1/2/3): 241–272.

Cochrane, J. 1988. How big is the random walk in GNP? *Journal of Political Economy* 96 (5): 893–920.

Collins, D., and S. Kothari. 1989. An analysis of intertemporal and cross-sectional determinants of earnings response coefficients. *Journal of Accounting and Economics* 11 (2/3): 143–181.

Dechow, P., and R. Sloan. 1991. Executive incentives and the horizon problem: An empirical investigation. *Journal of Accounting and Economics* 14 (1): 51–89.

Easton, P., and T. Harris. 1991. Earnings as an explanatory variable for returns. *Journal of Accounting Research* 29 (1): 19–36.

Gaver J., and K. Gaver. 1993. Additional evidence on the association between the investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Accounting and Economics* 16 (1/2/3): 125–160.

———, and ———. 1998. The relation between nonrecurring accounting transactions and CEO cash compensation. *The Accounting Review* 73 (2): 235–253.

Holmstrom, B. 1982. Moral hazard in teams. *The Bell Journal of Economics* 13 (2): 324–340.

Ittner, C., D Larcker, and M. Rajan. 1997. The choice of performance measures in annual bonus contracts. *The Accounting Review* 72 (2): 231–255.

Janakiraman, S., R. Lambert, and D. Larcker. 1992. An empirical investigation of the relative performance evaluation hypothesis. *Journal of Accounting Research* 30 (1): 53–69.

Jensen, M., and K. Murphy. 1990. Performance pay and top-management incentives. *Journal of Political Economy* 98 (2): 225–264.

Johnson, B. 1987. Discussion of management compensation contracts and merger-induced abnormal returns. *Journal of Accounting Research* 25 (Supplement): 77–84.

Kang, S., L. Zhang, and W. Baber. 1995. The size and determinants of random walk components in accounting earnings. Working paper, Carnegie Mellon University.

Kormendi, R., and R. Lipe. 1987. Earnings innovations, earnings persistence, and stock returns. *Journal of Business* 60 (3): 323–345.

Lambert, R., and D. Larcker. 1987. An analysis of the use of accounting and market measures of performance in executive compensation contracts. *Journal of Accounting Research* 25: 85–125.

Lipe, R., and R. Kormendi. 1994. Mean reversion in annual earnings and its implications for security valuation. *Review of Quantitative Finance and Accounting* 4: 27–46.

Perry, S., and R. Grinaker. 1994. Earnings expectations and discretionary research and development spending. *Accounting Horizons* 8 (4): 43–51.

Ramakrishnan, R., and J. Thomas. 1995. Valuation of permanent, transitory and price-irrelevant components of reported earnings. Working paper, Columbia University.

Sloan, R. 1993. Accounting earnings and top executive compensation. *Journal of Accounting and Economics* 16 (1/2/3): 55–100.

Smith, C., and R. Watts. 1982. Incentive and tax effects of executive compensation plans. *Australian Journal of Management* 7 (2): 139–157.

———, and ———. 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics* 32 (3): 263–292.

White, H. 1980. A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica* 48 (4): 817–838.

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Pre-Trial Settlement and the Value of Audits

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ABSTRACT: This paper studies the impact of liability rules and damage awards on audit effort and the value of an audit (the net benefits to society of an audit) when an auditor and an investor may settle before proceeding to trial. It is demonstrated that audit effort increases with size of the damage award, but may decrease with the rigor of the auditing standards. For a given level of damage award, allowing pre-trial settlements may reduce the value of the audit despite the reduction in the deadweight legal costs. On the other hand, if the damage award is optimally chosen, then allowing settlements increases social welfare. With an appropriately set damage award, strict liability standards result in the first-best outcome, while the first-best result cannot be obtained with vague negligence rules.

Key Words: *The value of audits, Pre-trial settlements, Auditing standards, Audit effort.*

I. INTRODUCTION

More than 90 percent of all lawsuits against auditors are resolved without going through trials.[1] This paper contributes to the literature on auditor liability (for example, Dye 1993, 1995; Schwartz 1997) by explicitly incorporating a pre-trial settlement option into a game between an investor and an auditor. The investor relies on the audit information to determine if a firm is unproductive and should be liquidated, and the auditor is motivated by litigation threats to produce an accurate audit report.

There are several key features in the model. First, priors on the probability the auditor will be found negligent if there is an audit failure depend on both the audit effort and the auditing standards. This modeling allows one to examine the impact of the rigor in auditing

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[1] Palmrose (1991) documents that the average trial rate prior to 1990 was 8 percent and the trial rate was stable over time.

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standards and a variety of negligence rules. Second, after an audit failure has been revealed, the auditor can learn more about his culpability than can the investor since the auditor has detailed knowledge of the audit strategy. Because the investor and auditor differ in their beliefs as to a trial's outcome, they may not agree on a settlement and proceed to trial. Third, the auditor's expected total litigation costs depend upon the probability of an audit failure, the probability the auditor will be judged guilty if there is a trial, and the probability there is a trial. Since the auditor's effort choice affects these probabilities, the litigation game between the investor and auditor endogenizes the auditor's total expected litigation costs. Finally, the paper focuses on the effect of the settlement option and various negligence rules on the value of the audit, or the increase in society's welfare due to the audit, as well as the audit effort.[2]

The paper demonstrates that audit effort responds positively to an increase in the damage award; the increased award makes trials more probable and penalties stiffer, motivating the auditor to work harder. If the auditing standards become more rigorous, the auditor may work less hard; with more stringent standards, the marginal impact of additional effort may decline, making it less worthwhile for the auditor to work hard. If the investor's lawyer raises his fees, the auditor works less hard; additional legal costs make the investor act less aggressively, reducing the probability of a trial. On the other hand, the impact of an increase in the auditor's legal fees is unclear; audit failures are more costly if the suit goes to court, but the probability of a trial declines.

The possibility of settling and avoiding a trial has several implications for the value of the audit. For a fixed level of the damage award, allowing settlements may lower the value of an audit. With the settlement option, a trial is not certain. While a reduction in the probability of a trial reduces directly the expected deadweight legal costs, it also induces the auditor to work less hard. On the other hand, if damages are optimally set for each option, society is better off with the possibility of a settlement.

The liability rule in the model can capture both a strict liability standard and a vague negligence rule. With appropriately set damages, the strict liability regime can result in the first-best audit value, but for no damage level will a negligence rule generate the first-best outcome. The strict liability rule aligns the investor's and the auditor's beliefs as to the probability of the auditor's guilt; with common beliefs, it is optimal for both parties to agree to a settlement, thereby avoiding all deadweight legal costs. Negligence rules are more vague, resulting in differing opinions and the pursuit of costly trials.

The issue of settlements has been widely studied in the law and economics literature. The first descriptive studies of the litigation process which paid attention to economic incentives were Posner (1973), Gould (1973), and Shavel (1982). While these early papers looked at litigation using a single-person decision model, the literature on the economics of settlements has moved toward a game-theoretic framework.

Using a game-theoretic approach, Png (1983) assumes the agents have asymmetric information. As in this paper, the defendant knows whether he is negligent and uses this information to decide whether to make the settlement offer; the plaintiff responds without certain information as to the defendant's guilt. Differing from this work, Png (1983) assumes the settlement amount is fixed. In Bebchuk (1984) and Reinganum and Wilde (1986), the settlement amount is a strategic choice variable. In both papers, and in contrast with this model, if the defendant rejects the plaintiff's settlement demand, the court resolves the dispute. Nalebuff (1987) and Png (1987) assume the plaintiff does not commit to litigation if there is no settlement in the pre-trial negotiation. In Nalebuff (1987), the probability that the defendant is held liable is exogenous, and neither Nalebuff (1987) nor Png (1987) makes welfare statements, while in this work the value of an audit is considered with an endogenized probability that the auditor is held liable.

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[2] Audit value is formally defined as the *ex ante* increase in a firm's value due to the hiring of an auditor, net of the audit costs and the expected deadweight litigation costs; this definition appears in Boritz and Zhang (1997). Audit value is similar to the phrase "social welfare" used in Schwartz (1997). Similar to both Schwartz (1997) and Boritz and Zhang (1997), this paper takes the perspective that audit value is a more important measure than audit effort for selecting a liability regime, setting the level of auditor liability and choosing the legal cost allocation system.

Smith and Tidrick (1997) and Boritz and Zhang (1997) use models of pre-trial settlement to address the effect of alternative legal cost allocation systems in an auditing context. Smith and Tidrick (1997) focus their analysis on audit effort whereas Boritz and Zhang (1997) focus on audit value. This paper extends these works in two ways. First, this paper allows for both strict and vague negligence liability rules, while the other papers look only at the strict liability rules. Second, this paper looks at several auditing issues not addressed in the other works—the impact of the auditing standards on audit effort, the effect of a settlement option on audit value, and the conditions under which the first-best audit value can be obtained.

Liability rules have been examined extensively. Liability standards studied in previous research include the strict liability rule (for example, Kornhauser and Revesz 1989; Melumad and Thoman 1990) and the negligence rule (for example, Dye 1993; Schwartz 1998). The liability rule used in this paper differs from earlier studies in that negligence is a function of the auditing standards as well as the audit effort since courts use the auditing standards as a benchmark for determining due care. This modeling of the liability rule can capture the characteristics of both negligence and strict liability standards. Hence, the effect on the value of an audit of a variety of negligence rules and the rigor in the auditing standards can be studied.

The remainder of the paper is constructed as follows: Section II describes the model; audit value is defined formally in Section III; Section IV finds the unique equilibrium for the model, computes the audit value in equilibrium, and presents an analysis of the equilibrium characteristics; concluding comments are made in Section V.

II. THE MODEL

Audit Technology, Audit Costs, and the Choice of Audit Effort

For reasons of consumption optimization, a group of risk-neutral investors wants to sell firms they currently own to a new generation of risk-neutral investors. Each firm is either a high or low type. A high firm has a continuance value (the present value of all its future cash flows) of V_{hc} and a liquidation value of V_{hl}; a low firm has a continuance value of V_{lc} and a liquidation value of V_{ll}, where $V_{hc} > V_{hl} > V_{ll} > V_{lc} > 0$. Thus, it is profitable for the high firm to remain in business while the low firm should be liquidated. It is common knowledge that fraction q of all firms are the high type, but the type of an individual firm is not observable to any investor.[3] Finally, absent any additional information, it is assumed no firm will be liquidated, or $qV_{hc} + (1 - q)V_{lc} > qV_{hl} + (1 - q)V_{ll}$. Thus, additional information can be socially valuable by distinguishing the two types; society loses $D = V_{ll} - V_{lc}$ every time the low, unproductive firm is not identified and liquidated.

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[3] The model does not require that there be two generations of investors or that a sale takes place. It only requires that the firm's owner makes his liquidation decision based on the additional information provided by the audit. Similarly, if there is a sale, it is not necessary to assume the old investor does not know the firm's type. If the old investor does know the firm's type, he must not have any strategic opportunities to signal or reveal his information to the new investor.

Auditing is mandatory and may generate additional information about a firm's type. The audit technology allows the auditor to identify correctly the high type firm; however a low type firm is sometimes mistakenly identified as the high type.[4] Let $\beta(n)$ be the probability that there is an audit failure, or the probability that the low type firm is incorrectly identified as the high type, where n is the audit effort level and $\partial\beta/\partial n < 0$ and $\partial^2\beta/\partial n^2 > 0$. Audit effort is not observable to any investor.

The audit fee is not contingent on the audit report or the unobservable effort level, but audit effort is costly, and an audit failure may be litigated. Each additional unit of effort has personal costs of C to the auditor. Given an audit failure, the auditor's total expected litigation costs vary with the negligence rule, the size of lawyers' fees, the magnitude of court award, etc. In this model the auditor's expected litigation costs are a function $L(\cdot)$ whose explicit form is determined by the litigation subgame played by the auditor and investor, as discussed in the following section. Thus, given the flat audit fee, the auditor picks his optimal effort level to minimize his expected total costs, TC, where:

$$TC = (1 - q)\beta(n)L(\cdot) + nC. \tag{1}$$

Litigation Subgame between the Auditor and Investor

If an audit failure occurred, meaning that the low firm was incorrectly identified as high, then the new investor or owner of the firm would have remained in business erroneously. Having failed to liquidate the firm, the investor can claim he suffered damages of D and sue the auditor for appropriate compensation. Prior to the trial, the investor and the auditor may attempt to costlessly negotiate a private settlement.[5] The model assumes the auditor makes the final offer which is either accepted by the investor or rejected in favor of a trial.[6] Thus, the litigation subgame is a two-stage game in which the auditor makes a settlement offer, followed by the investor's decision to accept the offer or to go to court. This litigation subgame between the auditor and investor endogenizes the expected total litigation cost, $L(\cdot)$, for the auditor.

The investor's and the auditor's decisions in the litigation subgame depend upon several litigation parameters and assumptions about the legal system. If the case goes to trial and the auditor is subsequently held liable, the auditor will be ordered to compensate the investor in the amount of A.[7] While the investor suffered a loss of D, the damage award ordered by the court may differ. Although the settlement process is free, a court trial is costly to both the auditor and the investor. If the case goes to trial, the auditor's legal fees are F_a, and the investor's legal fees are F_i. The judicial system is the American system, or the plaintiff and defendant pay their own legal expenses. Finally, the court is assumed infallible, always determining correctly whether the auditor satisfied the negligence standard.

The litigation subgame also depends on the investor's and the auditor's assessments that the auditor will be found negligent, or guilty, by the courts. When an audit failure is first observed, both the auditor and investor believe that the auditor is negligent with probability $J(n,k)$, where k represents the strictness of the auditing standards and $\partial J/\partial n \leq 0$,

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[4] This modeling is consistent with Dye (1993, 1995) and Schwartz (1997).

[5] Pre-trial negotiation is usually not cost-free (Posner 1973), but the cost is normally much lower than the trial cost. For simplicity, it is assumed that the cost of pre-trial negotiation is zero.

[6] Since the investor is the party who decides whether to take the case to trial, it is reasonable to assume that the auditor proposes the final offer. The investor could choose to reject the offer and not go to court; since this option is always weakly dominated by accepting the settlement, it is ignored.

[7] The auditor's wealth is assumed to be sufficiently high to guarantee the auditor is able to provide the compensation. For the effects of limited auditor wealth and liability insurance on the auditor's behavior, readers can refer to Dye (1993) and Sarath (1991).

$\partial^2 J/\partial n^2 \geq 0$, and $\partial J/\partial k \geq 0$. Thus, more effort reduces the probability the auditor would be held liable for an audit failure, while a higher or stricter auditing standard makes it more likely the court will rule against the auditor.

This liability rule J(n,k) can capture both the strict liability standard and the vague negligence liability rules in Schwartz (1998). When $J(n,k) = 1$ for all n and k, this is equivalent to a strict liability rule where the auditor is held responsible for all audit failures. If $0 < J(n,k) < 1$ for all n and k, this is a vague negligence rule where there is some uncertainty as to the auditor's guilt. Under negligence liability rules, the auditor is liable if he did not exercise due care, failed to work sufficiently hard or did not follow appropriate procedures. However, exact measures for due care are not well specified. The auditing standards defined in GAAS and SAS provide a benchmark for determining due care, but courts generally hold that the correct test in a negligence case is the standard of expertise and diligence common to the profession. Thus, with a vague negligence standard neither the auditor nor the investor knows whether the auditor will be held liable since auditing standards do not provide a perfect guide for due care and are subject to different interpretations across courts.

Following revelation of an audit failure, both the investor and the auditor may review the audit, looking for additional information about the auditor's guilt. To keep the model simple, it is assumed close examination of the firm's working papers allows the auditor to privately know if he was negligent. Specifically, the auditor learns if he is the negligent type (N) who will be found guilty if there is a trial or he is the nonnegligent type (H) who will be judged to be innocent. Also for simplicity, it is assumed review of the audit does not provide the investor with information beyond his priors.

Allowing the auditor and the investor to arrive at different conclusions after an investigation of the auditor's conduct makes the settlement game richer. If both parties have identical beliefs, they would always reach a settlement during the pre-trial negotiation. To save the legal fees of going to trial, parties with common beliefs would agree to settle for the investor's expected net compensation from a trial.

Figure 1 summarizes the litigation subgame that occurs after an audit failure. The equilibrium concept in the subgame is the sequential equilibrium of Kreps and Wilson (1982) with the additional condition that beliefs must satisfy universal divinity (Banks and Sobel 1987).[8] In the equilibrium to the model, the auditor selects his optimal effort level, n^*, anticipating the outcome to the litigation subgame should an audit failure occur. Since effort is publicly unobservable, the investor correctly anticipates the auditor's effort choice in the model's equilibrium, n^*, and forms his priors using this value, $J(n^*,k)$. The auditor, on the other hand, knows his own effort choice and uses priors J(n,k).

Finally, it is assumed that all cases involving audit failure have merit in the model's equilibrium, or:

$$J(n^*,k)A - F_i > 0. \tag{2}$$

After an audit failure, the investor's expectations of compensation from going to trial net of his legal fees is positive. If, *ex ante*, a case does not have merit, then the self-interested

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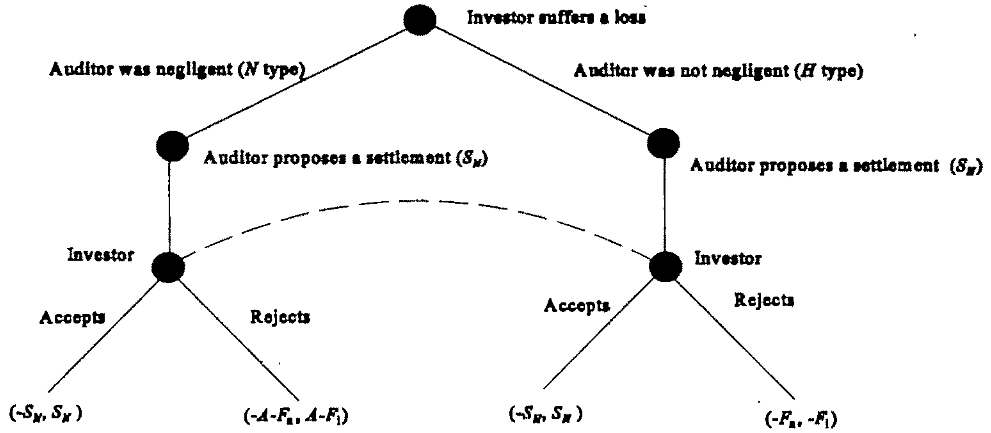
[8] Universal divinity is a criterion to restrict out-of-equilibrium beliefs. It works as follows. Assume there are two players (1 and 2) and there are two types for player 1 (s and t) which are not known to the player 2. For a fixed-equilibrium outcome and an out-of-equilibrium action a from player 1, if the set of the player 2's responses that make type t willing to deviate to action a is strictly smaller than the set of responses that make type s willing to deviate, the player 2 should believe that type s is infinitely more likely to deviate to a than is type t. The application of the criterion to this paper is described in the proof of Proposition 1.

FIGURE 1
Summary of Investor's and Auditor's Actions and Payoffs when the Auditor Has an Information Advantage over the Investor about the Outcome of a Potential Trial


Investor suffers a loss
Auditor was negligent (N type)
Auditor was not negligent (H type)
Auditor proposes a settlement (S_N)
Auditor proposes a settlement (S_N)
Investor
Investor
Accepts
Rejects
Accepts
Rejects
($-S_N$, S_N)
($-A-F_a$, $A-F_I$)
($-S_N$, S_N)
($-F_a$, $-F_I$)

The first element in parentheses is the auditor's payoff, the second is the investor's.

auditor would not have an incentive to exert any effort because rational investors would not go to trial even in the cases of audit failure.

The time line for the entire model is as follows:

Auditor's optimal effort choice:

1. An auditor is employed.
2. The auditor selects his effort level anticipating the probability of an audit failure and the outcome of the litigation subgame.
3. The auditor issues his report.
4. The investor purchases the firm and makes an investment decision based on the audit report.
5. If there was an audit failure, the investor suffers a loss of D.

Litigation subgame following an audit failure:

6. The auditor privately learns whether he was negligent (N) or not (H).
7. The auditor and investor attempt to reach a pre-trial settlement with the auditor making the last offer.
8. The investor decides whether to accept the offer or reject it and go to trial.
9. If the case goes to trial, the court determines correctly whether the auditor was negligent.

III. VALUE OF AUDITS

As noted above, auditing provides socially valuable information by identifying low or unproductive firms which should be liquidated. Every low firm that is liquidated saves society D; hence, the gross audit value, GV, generated when the auditor selects effort level n is:

$$GV = (1 - q) D - (1 - q)\beta(n)D, \tag{3}$$

where the expression $(1 - q)D$ is the benefits that perfect auditing would generate and $(1 - q)\beta(n)D$ is the costs to society of the expected audit failures when the auditor works at level n.

The auditor incurs both personal effort costs, nC, and expected litigation costs, L(·), when there is an audit failure. While all of the auditor's personal effort costs are social costs of providing the information, not all of the expected litigation costs are social costs since some of these costs are transfers from the auditor to the investor. For example, the damage award, A, is not part of the social costs of providing the audit information since the damage award is a payment from the auditor to the investor. On the other hand, if there is a trial and the investor must pay legal fees, these fees are part of the social costs of providing the audit information. Let the function R(·) be the investor's expected collections net of any legal costs, given an audit failure; the explicit form of the function is determined by the litigation subgame. Thus, the expected deadweight litigation costs after an audit failure, M(·), are the difference between the auditor's expected litigation costs and the investor's net collections, or $M(\cdot) = L(\cdot) - R(\cdot)$. The net value of audit, V, of providing the audit information when the audit effort level is n, can therefore be written as:

$$V = (1 - q)[1 - \beta(n)]D - (1 - q)\beta(n)M(\cdot) - nC. \tag{4}$$

In summary, the audit value has three components; the first term on the right-hand side of equation (4) is the loss society avoids through liquidation of some of the low firms, the second term is the expected deadweight litigation costs, and the third term is the costs of conducting the audit.

IV. RESULTS AND ANALYSIS

Solution to the Litigation Subgame Following an Audit Failure

The following proposition describes the unique equilibrium to the litigation subgame.

Proposition 1: The unique sequential equilibrium to the litigation subgame where beliefs satisfy universal divinity is as follows:

a. The nonnegligent (H) auditor offers settlement zero.
b. The negligent auditor (N) offers zero with a probability of π_N, where $\pi_N = [1 - J(n^*,k)]F_i/[J(n^*,k)(A - F_i)]$, and offers $A - F_i$ with a probability of $1 - \pi_N$.
c. The investor believes that an auditor offering zero is negligent with probability F_i/A; all other offers come from the negligent auditor. The investor accepts offers $S \in [A - F_i, \infty)$ with a probability of 1, rejects offers $S \in (0, A - F_i)$ with a probability of 1, and accepts $S = 0$ with a probability of $\gamma = (F_a + F_i)/(A + F_a)$.

The proof of this proposition and all others are in the appendix.

In the equilibrium to the litigation subgame, the nonnegligent auditor makes a settlement offer of zero, and the negligent auditor attempts to mimic the nonnegligent auditor by also offering zero. The investor, however, sues those offering zero with sufficient frequency to make the negligent auditor indifferent to offering zero and $A - F_i$, the smallest settlement the investor will accept.

Auditor's Optimal Effort Choice

The litigation game endogenizes the auditor's total expected litigation costs. From the settlement game, the auditor's total expected litigation costs after an audit failure, are $L(\cdot) = [1 - J(n,k)][(1 - \gamma)F_a] + J(n,k)[\pi_N(1 - \gamma)(A + F_a) + (1 - \pi_N)(A - F_i)]$. Substituting the expressions for γ and π_N from Proposition 1, $L(\cdot) = [J(n,k)\,A + F_a]\,(A - F_i)/(A + F_a)$. If all cases of audit failure go to trial, *ex ante* the auditor would expect $J(n,k)A + F_a$ in legal expenditures. The possibility of negotiating a settlement means not all cases go to trial. From Proposition 1, $1 - \gamma = (A - F_i)/(A + F_a)$ is the probability of a trial when zero is offered. Thus, the auditor's total expected litigation costs after an audit failure depend on both the probability of a trial and the *ex ante* expected damage collections given a trial.

Substituting $L(\cdot)$ into equation (1) gives the following value for the auditor's expected total costs:

$$TC = (1 - q)\beta(n)[J(n,k)A + F_a]\,\frac{A - F_i}{A + F_a} + nC. \tag{5}$$

The auditor selects his optimal effort level, n^*, to minimize his expected total costs. The first-order condition determining the auditor's optimal effort choice is:

$$\frac{\partial TC}{\partial n} = (1 - q)\left(\frac{\partial \beta(n^*)}{\partial n}[J(n^*,k)A + F_a] + \beta(n^*)\frac{\partial J(n^*,k)}{\partial n}A\right)\frac{A - F_i}{A + F_a} + C = 0. \tag{6}$$

With more effort, the auditor's personal costs of effort increase while his expected litigation costs decline because there are fewer audit failures and the auditor is less likely to be found negligent. The auditor selects an effort level where the marginal benefits from the reduced litigation costs equal the personal costs of another unit of effort.

> **Proposition 2:** The auditor's optimal effort level is an increasing function of the damage award, A, a decreasing function of the investor's legal fees, F_i, and may increase or decrease with the auditing standards, k, or the auditor's own legal fees, F_a.

When the damage award, A, is increased, the audit effort goes up for two reasons. First, the costs of not detecting an audit failure and of being found negligent increase directly. Second, the probability of a trial, $(A - F_i)/(A + F_a)$, goes up. For all effort levels, both forces increase the auditor's marginal litigation costs, resulting in a higher optimal effort choice. If the investor's legal fees, F_i, increase, trials becomes more costly for the investor and the probability of a trial is reduced. At all effort levels, the auditor's marginal litigation costs are reduced, resulting in a lower optimal effort choice.

When the auditing standards, k, are made more stringent there are two forces. First, at every level of the audit effort, the probability that the auditor is found negligent increases. On the other hand, the marginal impact of an increase in effort could increase or decrease since the sign of $\partial^2 J/\partial n \partial k$ is not specified. If an increase in the auditing standards causes changes in effort to have little impact on the auditor's total costs, the increase in the auditing standards may result in a decrease in the auditor's optimal effort choice. Figure 2 illustrates that optimal audit effort could increase or decrease with the rigor in the auditing standards.

Finally, an increase in the auditor's own legal fees, F_a, has two opposing effects on audit efforts: audit failures become more costly encouraging additional efforts, and the probability of a suit declines reducing efforts. Thus, when the auditor's legal fees go up, the auditor's optimal effort choice may increase or decrease, as illustrated in figure 3.

The Value of the Audit in Equilibrium

In the litigation subgame, the investor's expected net compensation after an audit error is $R(\cdot) = [1 - J(n,k)](1 - \gamma)(-F_i) + J(n,k)[\pi_N(1 - \gamma)(A - F_i) + (1 - \pi_N)(A - F_i)]$. In the equilibrium for the model, an auditor selects his optimal effort level, n*, and this optimal effort level is correctly inferred by the investor, or $n = n^*$. Making this substitution, and using the results of Proposition 1, in equilibrium, $R(\cdot) = J(n^*,k)A - F_i$. Thus, in equilibrium, the deadweight litigation costs are $M(\cdot) = L(\cdot) - R(\cdot) = [1 - J(n^*,k)]A(F_i+F_a)/(A + F_a)$. Substituting this expression for M(·) into the audit value in equation (4), gives:

$$V = (1 - q)[1 - \beta(n^*)]D - (1 - q)\beta(n^*)[1 - J(n^*,k)]\,\frac{A(F_i + F_a)}{A + F_a} - n^*C. \qquad (7)$$

The damage award, A, directly affects the value of the audit through the deadweight litigation costs and indirectly affects the value of the audit through the auditor's effort choice. A social planner could maximize the value of the audit by judicious selection of the damage award. The optimal audit value is thus the solution to the following program:

FIGURE 2

The Relationship Between the Optimal Audit Effort and Strictness of the Auditing Standards

$q = 0.5$, $\beta(n) = e^{-0.04\,n}$, $J(n,k) = e^{-0.05\,n/k}$, $F_a = 5$, $F_i = 5$, $C = 0.1$, $A = 15$

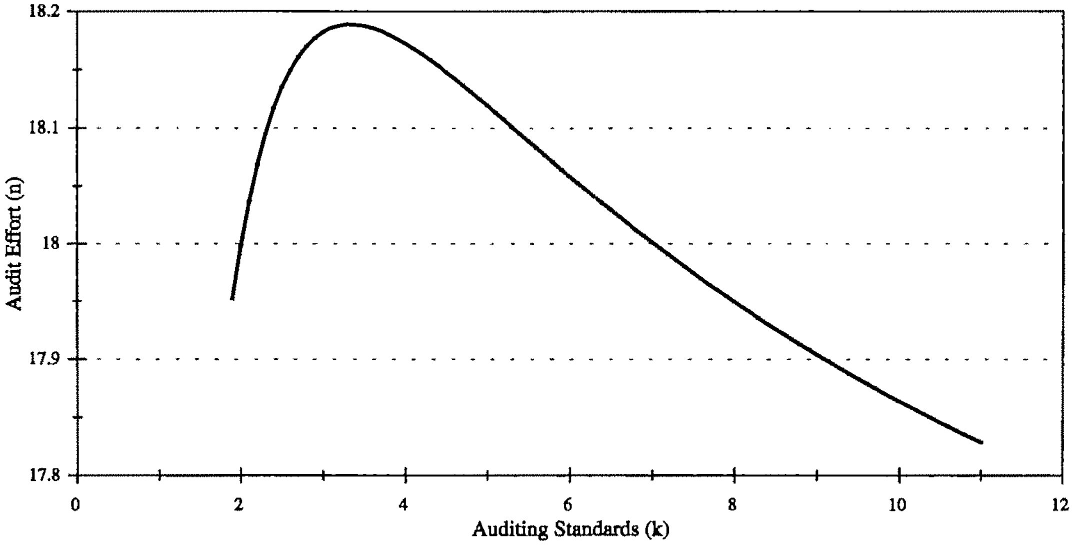
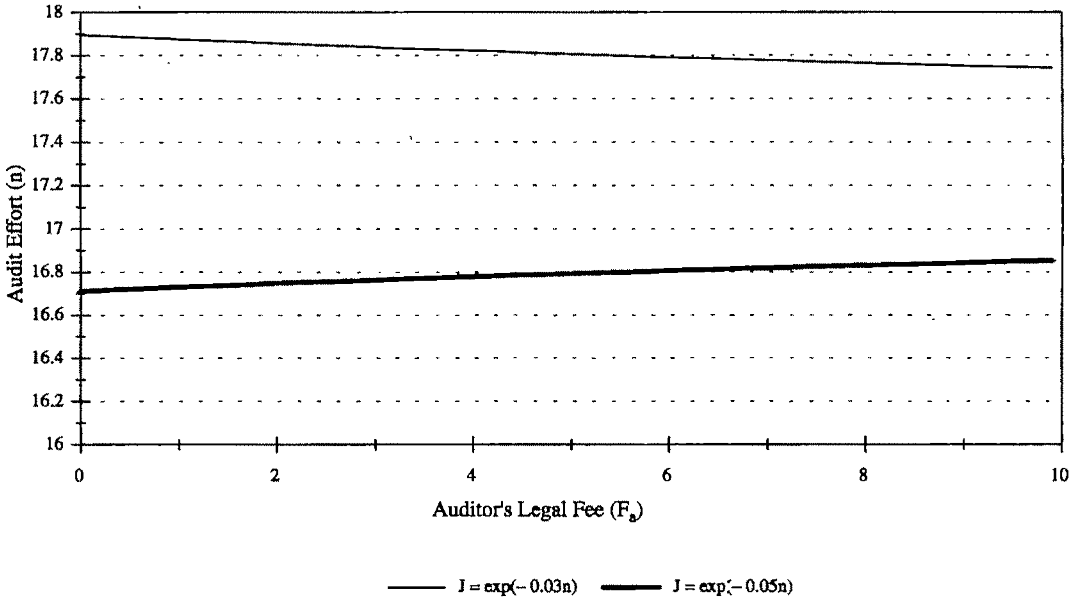


FIGURE 3
The Relationship Between the Optimal Audit Effort and the Auditor's Legal Fee
$q = 0.5$, $\beta(n) = e^{-0.04n}$, $F_i = 5$, $C = 0.1$, $A = 15$



$$\max_{n,A} V \text{ subject to } \frac{\partial TC}{\partial n} = 0. \tag{8}$$

The constraint is the auditor's incentive compatibility constraint.

To understand the impact of pre-trial settlements, a model without the settlement stage is constructed. Given an audit failure, the assumption that all suits in equilibrium have merit and are litigated is maintained. Without the settlement option, the auditor's expected litigation costs after an audit failure are $L_{ns}(\cdot) = J(n, k)A + F_a$. Hence, the auditor's expected total costs for an audit, TC_{ns}, are:

$$TC_{ns} = (1 - q)\beta(n)[J(n,k)A + F_a] + nC. \tag{9}$$

The first-order condition determining the optimal effort level, n_{ns}^*, is the following:

$$\frac{\partial TC_{ns}}{\partial n} = (1 - q)\left(\frac{\partial \beta(n_{ns}^*)}{\partial n}[J(n_{ns}^*,k)A + F_a] + \beta(n_{ns}^*)\frac{\partial J(n_{ns}^*,k)}{\partial n}A\right) + C = 0. \tag{10}$$

Given an audit failure, the investor's expected collections are $R_{ns}(\cdot) = J(n_{ns}^*,k)A - F_i$. Hence, the deadweight litigation costs are $M_{ns}(\cdot) = L_{ns}(\cdot) - R_{ns}(\cdot) = F_a + F_i$. With no settlements allowed, the value of the audit, V_{ns}, is:

$$V_{ns} = (1 - q)[1 - \beta(n_{ns}^*)]D - (1 - q)\beta(n_{ns}^*)(F_i + F_a) - n_{ns}^*C. \tag{11}$$

Comparing the model with pre-trial settlements to the one without, the following can be shown.

Proposition 3: For a given damage award level, the audit value when pre-trial settlements are allowed is not necessarily higher than the audit value when pre-trial settlements are not allowed. However, the optimal audit value when pre-trial settlements are allowed is always higher than the optimal audit value when pre-trial settlements are not allowed.

If the damage award is fixed, allowing pre-trial settlements reduces the deadweight legal costs ($M(\cdot) < M_{ns}(\cdot)$); however, this does not guarantee that the audit value is increased. By comparing equation (6) with equation (10), it is easy to see, given a fixed level for the damage award, $n_{ns}^* > n^*$; with pre-trial settlements the auditor's expected litigation costs are reduced, lowering the optimal effort level. When the damage award is small, the negative impact on the audit value of a lower audit effort may more than offset the positive impact of reduced deadweight legal costs. Figure 4 illustrates this result.[9]

On the other hand, if the damage award is optimally selected for each option, the settlement option always increases the audit value. With the possibility of settling, the damage award plays two roles in determining the audit value; first, it motivates the auditor to work hard, and second, it determines the probability of a trial. With settlements, by adjusting the damage award, the auditor can be motivated to work at any desired effort level without every case going to trial. Hence, the settlement option must dominate since the optimal nonsettlement effort level can be replicated while reducing the deadweight legal costs.

A second observation can be drawn from Figure 4. Due to the convexity of $\beta(n)$ and $J(n,k)$, when the damage award is small, the audit value increases quickly as the award increases. On the other hand, beyond the optimal damage award, the audit value decreases slowly as the award increases. This observation implies if society does not know the optimal damage award, it is safer to set the award high than to set the award low.[10]

In the model with pre-trial settlements, how do different negligence rules, and their corresponding optimal damage awards, compare? Ideally, the judicial system should be designed to obtain the first-best audit value, $V_{\text{first best}}$, or the maximum audit value when deadweight legal costs are zero:

$$V_{\text{first best}} = \underset{n}{\text{Max}}\ (1 - q)[1 - \beta(n)]D - nC. \tag{12}$$

Proposition 4: In the pre-trial settlement model, under the vague negligence liability rule, the optimal audit value is lower than the first-best audit value; under the strict liability rule, when $A = D + F_1$, the optimal audit value equals the first-best audit value.

When the strict liability rule, or $J(n,k) = 1$, is applied, the information asymmetry between an auditor and an investor is removed. With common beliefs, the investor and auditor will always settle out-of-court, eliminating the deadweight legal costs. When $0 < J(n,k) < 1$, as with a vague negligence rule, the deadweight legal costs are positive, and the optimal audit value is lower than the first-best audit value.

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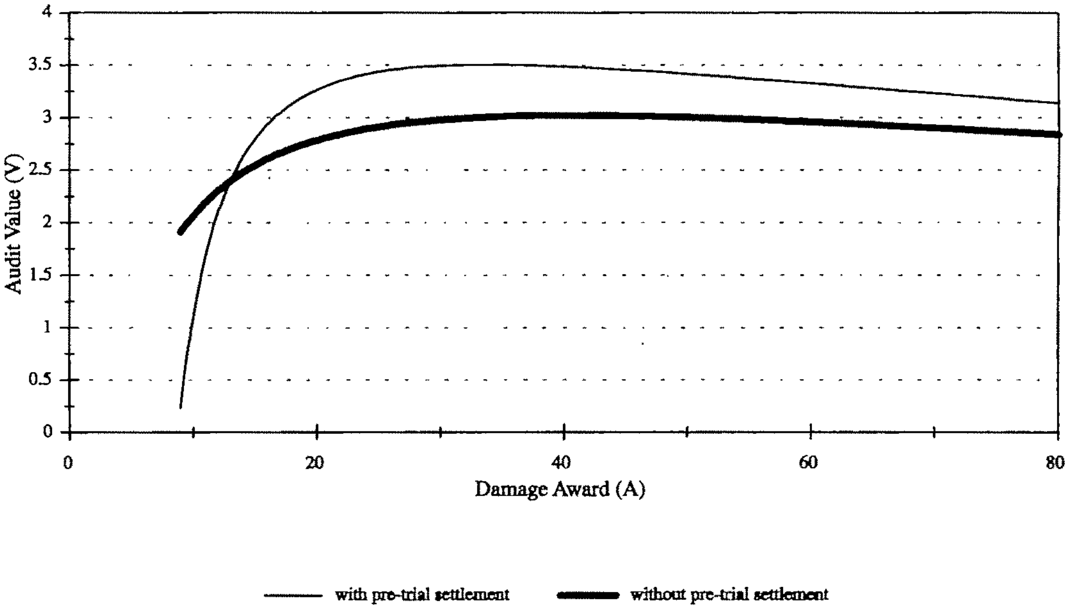
[9] As the auditor is the informed party in this game, it is the auditor who reaps the benefits from the settlement option. This is most easily seen by assuming both the effort level of the auditor and the damage award are fixed and comparing the two models. The auditor's expected costs are lower with the settlement option ($L(\cdot)$) than without ($L_{ns}(\cdot)$), while the investor's expected net collections ($R(\cdot)$ and $R_{ns}(\cdot)$) are the same.

[10] Several other functions have been used in the simulation and the same pattern remains. Since all these graphs are function specific, the generality of this observation is unknown.

FIGURE 4
The Relationship Between the Audit Value and the Damage Award With and Without Pre-Trial Settlements
$q = 0.5$, $\beta(n) = e^{-0.04\, n}$, $J(n,k) = e^{-0.02\, n}$, $F_a = 5$, $F_l = 5$, $D = 20$, $C = 0.1$



There are other practical considerations which weigh in favor of the strict liability rule. When $0 < J(n,k) < 1$, it is difficult for a court to determine the optimal damage award since the court may not know the function $\beta(n)$. The optimal damage award with a strict liability rule is $D + F_l$, a simple expression. Therefore, with the strict liability rule it is easier to provide guidance to the courts as to appropriate damage awards. With strict liability rules, laws that maximize the audit value can be written in a form which is easily understood and implemented.

This conclusion is consistent with Schwartz (1997) who finds the informational requirements to construct the optimal damage measure under the vague negligence rule to exceed those under the strict liability rule. However, Schwartz (1997) concludes, with appropriately chosen damage levels, both strict and vague negligence liability rules can maximize social welfare, whereas in this paper only strict liability rules can generate the first-best audit value. The costly trial process of this model causes the difference. With vague negligence liability rules, the investor and the auditor do not have common beliefs about a trial's outcome and may sometimes resort to a costly court trial when they cannot negotiate a settlement.

V. CONCLUSION

This paper has studied the impact of a settlement game between an investor and an auditor on the auditing market and the social value of the auditing information. By reducing the number of costly trials, settlements can reduce deadweight legal costs, but the reduced legal costs may also lower the auditor's incentives to prepare accurate reports. By appropriate selection of the damage awards, however, the auditor can be sufficiently motivated to produce correct reports to ensure that the net benefits from the settlement process are positive.

The impact of the settlement game on the auditor's incentives and the deadweight legal costs can be applied to other auditing contexts. This model assumes the audit has value by identifying firms which should be liquidated. Audit information serves other functions—it can solve a "lemons" problem, it can simply signal firm differences, it can create the "level playing field" necessary for the existence of a well-functioning securities market. This last function of the auditing market has received limited modeling attention and provides grounds for future research.

APPENDIX

Where the auditing standard, k, is not relevant, the function J(n,k) is simplified to J(n).

Proof of Proposition 1

Let $\sigma(S)$ be the probability with which the investor believes the auditor offering settlement S, $S \geq 0$, is negligent. Let $\gamma(S)$ be the probability that the investor accepts the offer S. Let $\pi_j(S)$ be the probability that the auditor type j, j = N, H (where N denotes negligent auditor and H denotes nonnegligent auditor), offers settlement S. $J(n^*)$ is the investor's prior beliefs that the auditor is negligent when it is anticipated that the equilibrium effort level will be n^*. In the following, the phrase "S is an equilibrium offer" means that S is offered on the equilibrium path by an auditor.

(1) **If $\sigma(S) = 0$, $\gamma(S) = 1$.**
Rejecting an offer from a known H type costs the investor F_i in legal fees; hence the investor accepts any nonnegative offer from a known H type.

(2) **If $S > A - F_i$, $\gamma(S) = 1$. If $S = A - F_i$ and $\sigma(A - F_i) = 1$, the investor is indifferent to suing and settling. However, when $\sigma(A - F_i) = 1$, $S = A - F_i$ will be an equilibrium offer only if $\gamma(A - F_i) = 1$.**
The most an investor can earn from going to court is $A - F_i$; hence any larger offer will be accepted. Suppose $\gamma(A - F_i) < 1$; an N auditor would not offer $A - F_i$ since, for sufficiently small ε, it can always cut its costs by offering $A - F_i + \varepsilon$, an offer that will be accepted.

(3) **No offer greater than $A - F_i$ can be an equilibrium offer.**
Consider the offer $A - F_i + \varepsilon$; by (2) this offer will be accepted by the investor. But, the offer $A - F_i + \varepsilon/2$ will also be accepted and is preferred by either auditor type.

(4) **If S is an equilibrium offer of the H auditor, $S \leq \min\{F_a, A - F_i\}$.**
From (3), H never offers more than $A - F_i$. If the H type is sued, his losses are his legal fees or F_a; thus H never offers more than F_a.

(5) **If $\sigma(S) = 1$ and $S < A - F_i$, the investor always rejects the offer.**
By suing a known N type, the investor receives $A - F_i$; hence, the investor would reject any offer less than this.

(6) **If $\gamma(S_1) = \gamma(S_2) = 1$, both S_1 and S_2 cannot be equilibrium offers.**
If both S_1 and S_2 are accepted by the investor, the auditor would make only the lower of the two settlement offers in equilibrium.

(7) **If $\sigma(S) = 1$ and S is an equilibrium offer of the N auditor, $S = A - F_i$.**
From (5) if $\sigma(S) = 1$ and $S < A - F_i$, this offer will be rejected costing the N auditor $A + F_a$. Since the offer $A - F_i + \varepsilon$ is an offer that will be accepted, and $A + F_a >$

$A - F_i + \varepsilon$ for sufficiently small ε, $S < A - F_i$, cannot be an equilibrium offer of the N auditor. From (3), if $S > A - F_i$, S is not an equilibrium offer.

(8) **If S is an equilibrium offer of H, S is also an equilibrium offer of N.**
Suppose S_1 is an equilibrium offer only of H, or $\sigma(S_1) = 0$; from (1), S_1 would be accepted. Let S_2 be offered by the N type (and also possibly by the H type). For the N type to (weakly) prefer offering S_2:

$$\gamma(S_2) \cdot S_2 + [1 - \gamma(S_2)](A + F_a) \leq S_1. \tag{A1}$$

For the H type to (weakly) prefer offering S_1:

$$\gamma(S_2) \cdot S_2 + [1 - \gamma(S_2)]F_a \geq S_1. \tag{A2}$$

For both (A1) and (A2) to hold simultaneous:

$$[1 - \gamma(S_2)](A + F_a) \leq S_1 - \gamma(S_2) \cdot S_2 \leq [1 - \gamma(S_2)]F_a, \tag{A3}$$

which is impossible, or (A1) and (A2) cannot simultaneously hold.

(9) **The H type makes a single equilibrium offer.**
Suppose the H auditor makes equilibrium offers of both S_1 and S_2. From (8) both offers must also be made by the N auditor. For the H auditor to be indifferent to the two offers:

$$\gamma(S_1) \cdot S_1 + [1 - \gamma(S_1)]F_a = \gamma(S_2) \cdot S_2 + [1 - \gamma(S_2)]F_a. \tag{A4}$$

For the N auditor to be indifferent:

$$\gamma(S_1) \cdot S_1 + [1 - \gamma(S_1)](A + F_a) = \gamma(S_2) \cdot S_2 + [1 - \gamma(S_2)](A + F_a). \tag{A5}$$

These two equations hold simultaneously only if $S_1 = S_2$.

Lemma 1: There does not exist a separating equilibrium in which the N and H auditors make distinct offers.
Suppose S_N (S_H) is the N (H) auditor's equilibrium offer in a separating equilibrium; note $\sigma(S_N) = 1$ and $\sigma(S_H) = 0$. From (7) and (2), $S_N = A - F_i$ and is accepted by the investor. From (1) and (4), $S_H \leq \min\{F_a, A - F_i\}$ and is accepted by the investor. Since both offers are accepted, (6) indicates they cannot be distinct equilibrium offers.

Lemma 2: Pooling equilibria exist only if $J(n^*)A - F_i \leq \min\{F_a, A - F_i\}$; the only pooling equilibria are as follows:

(a) Both auditors offer $\hat{S}$ where:

$$J(n^*)A - F_i \leq \hat{S} \leq \min\{F_a, A - F_i\} \tag{2-i}$$

and the investor always accepts $\hat{S}$. The investor believes $\sigma(\hat{S}) = J(n^*)$ and $\sigma(S) = 1$ for $S \neq \hat{S}$; the investor rejects all offers

S where $S \neq J(n^*)A - F_i$ and $S < A - F_i$ and accepts all offers S where $S \geq A - F_i$.

(b) **Both auditors offer $J(n^*)A - F_i$ and the investor randomizes, where:**

$$\gamma[J(n^*)A - F_i] \geq \frac{F_a + F_i}{F_a + F_i + [1 - J(n^*)]A}. \tag{2-ii}$$

The investor believes $\sigma[J(n^*)A - F_i] = J(n^*)$ and $\sigma(S) = 1$ for $S \neq J(n^*)A - F_i$.

The N auditor's best alternative to $\hat{S}$ is the offer $A - F_i$ which will be accepted; hence the N auditor offers $\hat{S}$ only if:

$$\gamma(\hat{S}) \cdot \hat{S} + [1 - \gamma(\hat{S})](A + F_a) \leq A - F_i. \tag{A6}$$

From (4) and the investor's beliefs, the H auditor offers $\hat{S}$ only if:

$$\gamma(\hat{S}) \cdot \hat{S} + [1 - \gamma(\hat{S})]F_a \leq \min\{F_a, A - F_i\}. \tag{A7}$$

Which actions can the investor take to sustain a pooling equilibrium? If $\gamma(\hat{S}) = 1$, there is a pooling equilibrium when equation (2-i) is satisfied; $\hat{S} \geq J(n^*)A - F_i$ insures that the investor wants to accept $\hat{S}$, and $\hat{S} \leq \min\{F_a, J(n^*)A - F_i\}$ insures (A6) and (A7) are satisfied. If $\gamma(\hat{S}) = 0$, (A6) cannot be satisfied, and a pooling equilibrium does not exist. If $\gamma(\hat{S}) \in (0,1)$, there is a pooling equilibrium only if the investor is indifferent between suing and settling, or if $\hat{S} = J(n^*)A - F_i$. Letting $\hat{S} = J(n^*)A - F_i$ in (A6) gives equation (2-ii) of the Lemma. The parameter restriction $J(n^*)A - F_i \leq \min\{F_a, J(n^*)A - F_i\}$ insures (A7) is satisfied.

Lemma 3: The only partially pooling equilibria are of the form:

(a) **The H type makes a single offer of $\hat{S}$, $\hat{S} \in [0, J(n^*)A - F_i]$**
(b) **The N type randomizes between $\hat{S}$ and $A - F_i$, offering $\hat{S}$ with probability $\pi_N(\hat{S})$, where:**

$$\pi_N(\hat{S}) = \frac{[1 - J(n^*)](F_i + \hat{S})}{J(n^*)(A - F_i - \hat{S})}. \tag{3-i}$$

(c) **The investor's beliefs are as follows:**

$$\sigma(S) = \begin{cases} (F_i + \hat{S})/A, & \text{for } S = \hat{S} \\ 1, & \text{Otherwise} \end{cases}. \tag{3-ii}$$

The investor accepts any offer S, where $S \geq A - F_i$, accepts $S = \hat{S}$ with probability $\gamma(\hat{S})$, where:

$$\gamma(\hat{S}) = \frac{F_a + F_i}{F_a + A - \hat{S}}, \tag{3-iii}$$

and rejects all other offers.

Restricting $\hat{S}$ to the interval $[0, J(n^*)A - F_i]$ insures that probabilities in (3-i), (3-ii) and (3-iii) are in the interval [0,1]. From (9), the H auditor makes a single equilibrium offer, $\hat{S}$. From (8), the N auditor must make the same offer. For this to be a partially pooling equilibrium, the N auditor must make a second distinct offer. From (7) and (2), this distinct offer must be $A - F_i$, and it is accepted. For the H auditor to weakly prefer offering $\hat{S}$ to $A - F_i$:

$$\gamma(\hat{S}) \cdot \hat{S} + [1 - \gamma(\hat{S})]F_a \leq A - F_i. \tag{A8}$$

For the N auditor to be indifferent between $\hat{S}$ and $A - F_i$:

$$\gamma(\hat{S}) \cdot \hat{S} + [1 - \gamma(\hat{S})](A + F_a) = A - F_i. \tag{A9}$$

Solving (A9), gives equation (3-iii) of the Lemma. This expression for $\gamma(\hat{S})$ also satisfies (A8). Since $\hat{S} \leq J(n^*)A - F_i$, $1 > \gamma(\hat{S}) > 0$. Thus the investor is indifferent to accepting and rejecting $\hat{S}$, or randomizes on accepting and rejecting $\hat{S}$. The investor is indifferent to these two actions, if:

$$\sigma(\hat{S})A - F_i = \hat{S}. \tag{A10}$$

The investor anticipates that the auditor will work at intensity n*, and hence his prior probability that the auditor is negligent is J(n*). The investor anticipates that the N auditor will offer $\hat{S}$ with probability $\pi_N(\hat{S})$. Thus, the posterior probability that an auditor offering $\hat{S}$ is negligent is:

$$\sigma(\hat{S}) = \frac{J(n^*) \cdot \pi N(\hat{S})}{J(n^*) \cdot \pi_N(\hat{S}) + [1 - J(n^*)]}. \tag{A11}$$

Substituting (A11) into (A10) and solving for $\pi_N(\hat{S})$ gives equation (3-i) of the Lemma. Substituting this expression for $\pi_N(\hat{S})$ into (A11) gives equation (3-ii) of the Lemma. Beliefs that $\sigma(S) = 1$ for all offers other than $\hat{S}$ are consistent and insure that the auditor does not want to make any other offer.

Finally, it is shown that the only equilibrium in which the off-the-equilibrium path beliefs satisfy universal divinity is that listed in Proposition 1. Consider the pooling equilibrium in part (a) of Lemma 2, where both auditors offer $\hat{S}$. Consider the offer $\hat{S} - \varepsilon$ and ask for each auditor type with what probability would the investor have to accept $\hat{S} - \varepsilon$ to make this offer preferred to the equilibrium offer of $\hat{S}$. By comparing each auditor's equilibrium payoff with the payoff he would receive if the investor accepted $\hat{S} - \varepsilon$ with probability α_i, i = N, H, one can compute the range of acceptance probabilities that would make each auditor type prefer the offer $\hat{S} - \varepsilon$:

$$\alpha_N \geq \frac{F_a + F_i}{A + F_a + \varepsilon - \hat{S}} \tag{A12}$$

and

$$\alpha_H \geq \frac{(F_a + F_i)(F_a - \hat{S})}{(F_a - \hat{S} + \varepsilon)(A + F_a - \hat{S})}. \tag{A13}$$

It is readily shown that $\alpha_N > \alpha_H$; hence, H would pick $\hat{S} - \varepsilon$ over $\hat{S}$ on a larger set. Thus universal divinity requires that $\sigma(\hat{S} - \varepsilon) = 0$, and the pooling equilibrium cannot be sustained.

Similarly, all equilibria other than the one in Proposition 1 are eliminated while the equilibrium in the proposition survives. (Details of the computations are available from the authors upon request.)

Proof of Proposition 2

Let

$$Q = [J(n^*)A + F_a]\frac{\partial^2\beta}{\partial n^2} + 2A\frac{\partial\beta}{\partial n}\frac{\partial J}{\partial n} + A\,\beta\frac{\partial^2 J}{\partial n^2} > 0. \tag{A14}$$

Implicitly differentiating the first order condition given in equation (6) gives the following:

$$\frac{dn^*}{dA} = \frac{-\dfrac{\partial\beta}{\partial n}F_a(F_a + F_i) - \left(J\dfrac{\partial\beta}{\partial n} + \beta\dfrac{\partial J}{\partial n}\right)(A^2 + 2AF_a - F_aF_i)}{(A + F_a)(A - F_i)Q} > 0, \tag{A15}$$

and

$$\frac{dn^*}{dk} = \frac{-A\left(\dfrac{\partial\beta}{\partial n}\dfrac{\partial J}{\partial n} + \beta\dfrac{\partial^2 J}{\partial n\partial k}\right)}{Q}. \tag{A16}$$

Since $\partial^2 J/\partial k\partial n$ can be positive or negative, dn^*/dk can be positive or negative as shown in Figure 2.

$$\frac{dn^*}{dF_i} = \frac{[J(n^*)A + F_a]\dfrac{\partial\beta(n^*)}{\partial n} + A\beta(n^*)\dfrac{\partial J(n^*)}{\partial n}}{(A - F_i)Q} < 0, \tag{A17}$$

and

$$\frac{dn^*}{dF_a} = \frac{A\left[-[1 - J(n^*)]\dfrac{\partial\beta(n^*)}{\partial n} + \beta(n^*)\dfrac{\partial J(n^*)}{\partial n}\right]}{(A + F_a)Q}. \tag{A18}$$

Figure 3 shows dn^*/dF_a can be positive or negative.

Proof of Proposition 3

The difference between the audit values under the two systems is:

$$\begin{aligned} V - V_{ns} = {} & (1 - q)[\beta(n^*_{ns}) - \beta(n^*)]D \\ & +(1 - q)\left(\beta(n^*_{ns}) - \beta(n^*)[1 - J(n^*)]\frac{A}{A + F_a}\right) \\ & (F_i + F_a) + (n^*_{ns} - n^*)C. \end{aligned} \qquad \text{(A19)}$$

As argued in the text, $n_{ns}^* > n^*$; hence the sign of the first term on the right-hand side of (A19) is negative, the sign of the second term is indeterminable, and the sign of the third term is positive. Figure (4) shows that the difference $V - V_{ns}$ can be positive or negative.

Let A^o, n^o and $V_{ns}{}^o$ be the optimal values for the damage award, effort level, and audit value, respectively, when settlements are not allowed. Note it is assumed $J(n^o)A^o - F_i > 0$. With the settlement option, Proposition 2 shows the optimal effort level is increasing in the damage award, A; examination of equation (6) also indicates that by increasing A sufficiently one can attain any effort level. Let $\hat{A}^o$ be the damage award level which induces n^o in the model with settlements. (Note $J(n^o)\hat{A}^o - F_i > J(n^o)A^o - F_i > 0$; hence, the solution to the settlement game applies.) Using n^o for the effort level and $\hat{A}^o$ for the damage award when settlements are allowed, one can compute:

$$V - V^0_{ns} = (1 - q)\beta(n^o)\frac{[J(n^o)\hat{A}^o + F_a](F_i + F_a)}{\hat{A}^o + F_a} > 0. \qquad \text{(A20)}$$

Since the settlement option makes society better off when the damage award is $\hat{A}^o$, it clearly will make society better off if the damage award is optimally chosen in the settlement model.

Proof of Proposition 4

The expected deadweight legal costs, DC, have the following value:

$$DC = (1 - q)\beta(n)M(\cdot) = (1 - q)\beta(n)[1 - J(n,k)]A\frac{F_i + F_a}{A + F_a}. \qquad \text{(A21)}$$

Since A, F_i and F_a are greater than zero, DC is greater than zero if J(n,k) is less than 1. Since under the vague negligence liability rule $J(n,k)<1$ for all n and k, the audit value is lower than the first-best value.

Under strict liability rule, $J(n,k) = 1$ for all n and k, hence $DC = 0$. From program (12) the first-best effort level, $n_{\text{first best}}$, is the effort level which satisfies the equation:

$$(1 - q)D\frac{\partial\beta(n_{\text{first best}})}{\partial n} + C = 0. \qquad \text{(A22)}$$

From (6), when $J(n,k) = 1$, the auditor will select $n_{\text{first best}}$ if $A = D + F_i$.

REFERENCES

Banks, J. S., and J. Sobel. 1987. Equilibrium selection in signaling games. *Econometrica* 55: 647–661.

Bebchuk, L. R. 1984. Litigation and settlement under imperfect information. *RAND Journal of Economics* 15 (3) (Autumn): 404–415.

Boritz, J. E., and P. Zhang. 1997. The implications of alternative litigation cost allocation systems for the value of audits. *Journal of Accounting, Auditing, and Finance* 12: 353–372.

Dye, R. A. 1993. Auditing standards, legal liability, and auditor wealth. *Journal of Political Economy* 101 (5): 887–914.

———. 1995. Incorporation and the audit market. *Journal of Accounting and Economics* 19: 75–114.

Gould, J. P. 1973. The economics of legal conflicts. *Journal of Legal Studies* 2 (2) (June): 279–300.

Kornhauser, L. A., and R. L. Revesz. 1989. Sharing damages among multiple tortfeasors. *The Yale Law Journal* 98 (5): 831–884.

Kreps, D. M., and R. Wilson. 1982. Sequential equilibria. *Econometrica* 50: 863–894.

Melumad, N., and L. Thoman. 1990. On auditor and courts in an adverse selection setting. *Journal of Accounting Research* 28 (Spring): 77–120.

Nalebuff, B. 1987. Credible pretrial negotiation. *RAND Journal of Economics* 18 (2) (Summer): 198–210.

Palmrose, Z. 1991. Trials of legal disputes involving independent auditors: Some empirical evidence. *Journal of Accounting Research* 29 (Supplement): 149–185.

Png, I. P. L. 1983. Strategic behavior in suit, settlement, and trial. *Bell Journal of Economics* 14: 539–550.

———. 1987. Litigation, liability, and incentives for care. *Journal of Public Economics* 34: 61–85.

Posner, R. 1973. An economic approach to legal procedure and judicial administration. *Journal of Legal Studies* 2: 399–458.

Reinganum, J. F., and L. L. Wilde. 1986. Settlement, litigation, and the allocation of litigation costs. *RAND Journal of Economics* 17 (4) (Winter): 557–566.

Sarath, B. 1991. Uncertain litigation and liability insurance. *RAND Journal of Economics* 22 (Summer): 218–231.

Schwartz, R. 1997. Legal regimes, audit quality and investment. *The Accounting Review* 72 (3): 385–406.

———. 1998. Auditors' legal liability, vague due care and auditing standards. *Review of Quantitative Finance and Accounting* 11 (2) (September): 183–207.

Shavel, S. 1982. Suit, settlement, and trial: A theoretical analysis under alternative methods for the allocation of legal costs. *Journal of Legal Studies* 11: 55–81.

Smith, R., and D. Tidrick. 1997. The effect of alternative judicial systems and settlement on auditing. *Review of Accounting Studies* 2 (4): 253–281.

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Does Performing Other Audit Tasks Affect Going-Concern Judgments?

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ABSTRACT: This study examines whether personally performing other audit tasks can bias supervising seniors' going-concern judgments. During an audit, the senior performs some audit tasks him/herself and delegates other tasks to staff members. When personally performing an audit task, the senior would focus on the evidence related to that task. We predict that such evidence will have greater influence on the senior's subsequent going-concern judgment. The results of our experiment are consistent with our predictions. When provided with an identical set of information, seniors who performed another audit task for which the underlying facts of the case reflected positively (negatively) on the company's viability, subsequently made going-concern judgments that were relatively more positive (negative). Our results also demonstrate that the well-documented tendency of auditors to attend more to negative information does not always dominate auditors' information processing. Subjects who performed the task for which the underlying facts reflected positively on the company's viability directed their attention to such positive information and, consequently, both their memory and judgments were more positive than those of subjects in the other conditions. Recent findings indicating that biases in seniors' going-concern judgments may not be fully offset in the review process are discussed along with other potential implications of our results.

Key Words: *Going-concern judgments, Attention, Memory, SAS No. 59.*

Data Availability: *Contact the authors.*

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I. INTRODUCTION

Statement on Auditing Standards No. 59 (AICPA 1988) (hereafter referred to as SAS No. 59) specifies the auditor's responsibility for assessing an entity's ability to continue as a going concern. The standard requires that on every audit the auditor must evaluate whether there is substantial doubt about the firm's ability to continue as a going concern. However, SAS No. 59 indicates that it is not necessary to design audit procedures solely for this purpose. Rather, the auditor's responsibility is limited to considering whether the application of standard audit procedures identifies "conditions and events that, when considered in the aggregate, indicate there could be substantial doubt about the entity's ability to continue as a going concern" (AICPA 1988, 4).

Implied in this limited requirement is the assumption that all of the information relevant to the going-concern judgment will come to the attention of the auditor in an unbiased manner as a by-product of performing other standard audit procedures. However, this assumption may be invalid if certain evidence is more salient to the auditor merely because he or she personally performs some of the standard audit tasks. Indeed, studies in psychology have shown that different processing objectives influence subsequent memory and judgments (cf. Lingle and Ostrom 1979; Sherman et al. 1983). That is, subjects provided with identical information, but assigned to different processing objective conditions, recalled different information and made different judgments depending on their processing condition assignment. The differences in recall and judgment are generally attributed to subjects' differential attention to information.

The primary purpose of this study is to examine whether personally performing other audit tasks during the audit can bias supervising seniors' going-concern judgments. In the process of conducting an audit, the supervising senior (hereafter referred to as the senior) performs some audit tasks him/herself and delegates other tasks to staff members. When personally performing an audit task, the senior would tend to focus most heavily on the audit evidence related to that specific task. Such evidence would in turn be likely to have a greater influence on the senior's subsequent going-concern judgment. That is, even though the senior reviews all of the audit evidence, his or her going-concern judgment might inadvertently be biased toward the audit evidence specifically related to the audit tasks he or she personally performed.

Although the senior's preliminary going-concern judgment does not necessarily represent the audit firm's final going-concern judgment, the senior's judgment nevertheless has a significant effect on the firm's final judgment. The senior's going-concern judgment is typically reviewed by superiors and becomes an important input into the superiors' judgments (Choo and Trotman 1991; Libby and Trotman 1993). Although Libby and Trotman (1993) have shown that a reviewing auditor may partially offset any bias in the senior's preliminary judgment when the reviewing auditor has access to *all* of the original evidence evaluated by the senior, recent studies have shown that in actual audit settings the evidence available to the reviewing auditor may be a biased subset of the original evidence. For example, Ricchiute (1999) provides evidence that seniors have superior memory for facts consistent with their going-concern judgments and that these are the facts they are most likely to document in the workpapers. Ricchiute's (1999) results are consistent with those of Libby and Trotman (1993) and Tan (1995) who also show that seniors have superior memory for facts consistent with their going-concern judgments, and with those of Koonce et al. (1995) who show that seniors attempt to justify their judgments by documenting evidence consistent with those judgments.

Ricchiute (1999, 155–156) points out that workpaper evidence is often documented by the senior responsible for the going-concern judgment *after* the judgment has been made. Thus, documentation is likely to be influenced by memory or the desire to justify the judgment (Gibbins 1984, 116–117; Emby and Gibbins 1988, 288–289).[1] Similarly, Rich et al. (1997a) suggest that seniors may interpret evidence and present or incompletely document evidence so as to persuade their superiors and enhance their reputations. Consequently, the reviewing auditor may not have access to all of the information that is inconsistent with the senior's going-concern judgment; thus the reviewing auditor's judgment might be biased toward the senior's judgment. Ricchiute's (1999) second experiment provides evidence on this latter point. His results show that reviewing partners who received workpapers containing the subset of evidence seniors indicated they would document in the workpapers (determined in his first experiment) made going-concern judgments that were biased in the direction of the seniors' judgments. Thus, it appears that biases in seniors' going-concern judgments may not be fully offset by the review process.

Going-concern judgments have been the focus of a considerable amount of recent research (e.g., Kida 1984; McKeown et al. 1991; Asare 1992; Chen and Church 1992; Richiutte 1992, 1999; Kennedy 1993, 1995; Libby and Trotman 1993; Davis and Ashton 1995; Raghunandan and Rama 1995; Tan 1995; Louwers 1998). In his review of the going-concern literature, Asare (1990) identified the auditor's ability to identify companies experiencing going-concern difficulties as one of several important research issues, suggesting that more research is needed to better understand the decision processes of auditors making going-concern judgments. Recently, Raghunandan and Rama (1995) reported that 62 percent of their sample of firms that had failed since SAS No. 59 went into effect received a going-concern modified opinion in the period prior to bankruptcy. Prior to SAS No. 59, 39 percent of failed firms had received a going-concern modified opinion in the period prior to bankruptcy. Thus, despite the apparent improvement resulting from the adoption of SAS No. 59, the quality of auditors' going-concern judgments remains an area of concern for both auditors and users of audited financial statements. Given the potential economic impact that a biased going-concern judgment could have on both the auditing firm and the client, it is important for auditors to know whether such biases can occur, and if necessary, to try to develop procedures or decision aids to safeguard against them.

The results of our experiment suggest that personally performing other audit tasks can bias seniors' subsequent going-concern judgments. When provided with identical information, seniors who performed another task for which the underlying facts reflected positively (negatively) on the company's ability to continue as a going concern, subsequently made going-concern judgments that were relatively more positive (negative). In addition, our results demonstrate that the well-documented tendency of auditors to attend more fully to negative information (Smith and Kida 1991) does not always dominate auditors' information processing. Subjects who performed another task for which the underlying facts reflected positively on the company's viability directed their attention to such positive information in the case, and consequently both their memory and their going-concern judgments were more positive than those of subjects in either of the other two conditions.

II. THEORY AND HYPOTHESES

Effects of Other Tasks on Memory and Going-Concern Judgments

The psychology and social cognition literatures describe how task complexity can influence cognitive processing and the related judgments when decision makers attempt to perform more than one task simultaneously (e.g., Wyer and Srull 1989). SAS No. 59 implies such simultaneous processing when suggesting that no separate going-concern procedures are necessary because the information relevant to the going-concern judgment comes to the attention of the auditor as a by-product of performing other standard audit procedures. Consistent with this view, Asare (1992, 391) notes that auditors typically "perform the going-concern task contemporaneously with other audit tasks."

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[1] Ricchiute (1999) manipulated accountability (i.e., whether subjects faced a review by the national office) in an attempt to ascertain whether his finding that seniors tend to document evidence consistent with their judgments was due to memory effects or justification. Because there were no significant differences between the two accountability conditions, Ricchiute (1999) concluded that his results were not driven by seniors' desire to justify their judgments.

According to Wyer and Srull (1989), if the procedures necessary to perform some other audit task and make the going-concern judgment were relatively simple or had become automatic,[2] then seniors would be able to process the relevant information as it is encountered and update their going-concern judgment accordingly. Judgments such as this, which are updated as information is encountered, are typically referred to as on-line judgments (Hastie and Park 1986).

In contrast, if the procedures necessary to perform the other audit task or the going-concern judgment were relatively complex and had not become automatic, it is unlikely that the senior would be able to perform both tasks on-line. Rather, because of the more immediate demands of the other audit task, the senior would concentrate on performing that task on-line, while simultaneously storing the information relevant to the going-concern judgment in long-term memory. Long-term memory is a permanent information store generally assumed to have unlimited capacity. Subsequently, when a going-concern judgment is required, the relevant information would be retrieved from long-term memory. Judgments such as this, which are based on information retrieved from long-term memory, are typically referred to as memory-based judgments (Hastie and Park 1986).

Making a going-concern judgment is generally viewed as a difficult and complex task (Chow et al. 1987, 128–129). Thus, as suggested above, seniors are unlikely to be able to simultaneously perform another audit task and make a going-concern judgment on-line. Rather they would likely perform the other audit task on-line and store the going-concern information in long-term memory for subsequent retrieval when making the going-concern judgment.

Given that seniors' going-concern judgments are likely to be based at least partially on information retrieved from memory, the question becomes whether the senior's memory and related going-concern judgments are influenced by having personally performed another audit task. Wyer and Srull (1989) suggest that this will depend on whether the senior's working memory capacity is exceeded when they are performing the tasks. Working memory is a temporary information store with limited capacity that contains information currently being processed and the results of this processing. Information is held in working memory as long as it is relevant to a current processing objective and there is sufficient space. If the capacity of working memory is exceeded, information will be automatically displaced according to its degree of relevance or importance to the current processing objective (Wyer and Srull 1989, 35).

If the amount of information that must be processed to perform the other audit task and the going-concern judgment is manageable, seniors' working memory capacity would not likely be exceeded. Therefore, they would be able to adequately process all the going-concern relevant information and transfer this information to long-term memory before it is displaced from working memory. Consequently, all of the information relevant to the going-concern judgment would be available for retrieval from long-term memory when the senior makes the memory-based going-concern judgment. As such, the senior's going-concern judgment would be unbiased.

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[2] When tasks are performed frequently, the procedures may become automatic, and as such require limited cognitive effort (Schneider and Shiffrin 1977; Langer 1978; Bargh 1984; Fazio 1986, 1990).

Alternatively, if a large amount of information must be processed, seniors' working memory capacity could be exceeded, and thus they would be unable to adequately process all of the going-concern related information before it is displaced from working memory and transferred to long-term memory. However, the immediate demands of the other audit task would likely result in heavy processing of the information related to that task before such information is transferred to long-term memory. Consequently, it is this latter information that is likely to be retrieved when the memory-based going concern judgment is made. Thus, the senior's performance of the other audit task biases the information retrieved from long-term memory, which in turn produces a biased going-concern judgment.

Although the going-concern task requires auditors to evaluate a large amount of information, it is also a very important and familiar task that is performed on every audit. When familiar tasks are performed frequently, they tend to require less cognitive processing capacity (Schneider and Shiffrin 1977; Langer 1978; Bargh 1984; Fazio 1986, 1990) and, as such, more working memory capacity becomes available for other processing. Consistent with this view, Kennedy (1993, 243) suggests that the reason the auditors in her study made unbiased going-concern judgments was that they were experienced professionals performing a familiar task. Similarly, based on a review of earlier studies, Smith and Kida (1991) conclude that auditors are less prone to memory and judgment biases than are subjects in psychology studies because they are knowledgeable experts performing familiar tasks. Moreover, the results of a recent study by Sprinkle and Tubbs (1998) suggest that auditors' memory is better for more important information.

In contrast to the view that auditors' experience and familiarity with audit tasks will reduce or eliminate the types of memory and judgment biases reported in the psychology literature, several studies have shown that such biases can persist in the audit environment. For example, Asare (1992) found recency effects in auditors' going-concern judgments and Kennedy (1995) found that auditors going-concern judgments were susceptible to "the curse of knowledge" bias.

Given the opposing arguments and mixed evidence regarding whether auditors' memory and going-concern judgments are likely to be biased, we test two pairs of competing hypotheses. The first pair of competing hypotheses relates to the effect of performing another audit task on seniors' memory of information related to the going-concern task:

H1a: Personally performing another audit task biases seniors' memory of going-concern-related information.

H1b: Personally performing another audit task does not bias seniors' memory of going-concern-related information.

The second pair of competing hypotheses relates to the effect of performing another audit task on seniors' going-concern judgments:

H2a: Personally performing another audit task will bias seniors' going-concern judgments.

H2b: Personally performing another audit task will not bias seniors' going-concern judgments.

The Relation Between Memory and Judgment

If it is found that performing another audit task biases seniors' memory and their going-concern judgments (i.e., H1a and H2a are supported), a statistical approach suggested by

Shedler and Manis (1986) can be used to test whether the bias in going-concern judgments results from biased memory. Shedler and Manis (1986) argue that finding a simple correlation between memory and judgment is not sufficient to conclude that a judgment is memory-based (i.e., that memory mediates the judgment). In their study they found that an antecedent condition independently affected both memory and judgment. Moreover, a statistical examination of the alternative causal sequences indicated that subjects' judgments were *not* mediated by memory.

In our setting, a parallel result would be that both the biased going-concern judgments and the bias in memory would be a consequence of performing the other audit task. However, the biased going-concern judgments would not be a consequence of the biased memory. Rather, performing the other audit task would have biased the going-concern judgments and memory independently, and thus memory would not be causally related to seniors' going-concern judgments.

Alternatively, if the going-concern judgment bias arises because the seniors based their judgments on biased information retrieved from memory, then memory would be causally related to the judgments. Distinguishing between these alternatives is important because understanding the process by which going-concern judgments are made can help determine what type of decision aid is most likely to reduce any bias in such judgments.

The alternative predictions regarding the causal relation between memory and judgments lead to the following pair of competing hypotheses:

H3a: Seniors' going-concern judgments are causally related to memory.

H3b: Seniors' going-concern judgments are not causally related to memory.

III. EXPERIMENT

Subjects

One hundred thirty-one seniors from three Big 5 accounting firms (with an average of 2.9 years of experience) participated in the study, yielding 120 usable observations.[3] Seniors were selected as subjects because they have the appropriate level of experience to perform the experimental tasks in that they regularly perform analytical procedures (Heiman 1990; Hirst and Koonce 1996) and make preliminary going-concern judgments (Choo and Trotman 1991; Libby and Trotman 1993).

Design

We test our hypotheses using a between-subjects design with Other Task as the independent factor with three levels: Positive, Negative, and Control. Subjects in all three conditions were asked to assume the role of a newly appointed supervisor of an audit of a medium-sized manufacturing company and were provided with *identical* case materials consisting of (1) a description of the company, (2) an unaudited balance sheet and income statement for the current year, and (3) audited statements for the previous year. In the Positive condition, the other task (described below) required subjects to process facts from the case materials that reflected positively on the company's ability to continue as a going concern. In the Negative condition, the other task required subjects to process facts from the case materials that reflected negatively on the company's ability to continue as a going concern. In the Control condition, subjects were not instructed to perform any specific task while reading the case materials (i.e., subjects in the Control condition were not provided with any processing objective). The responses of subjects in the Control condition provide a baseline against which the responses of subjects in the Positive and Negative conditions can be compared.

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[3] Ten participants did not complete the study and one additional subject was not included in the analysis because he or she appears to have misunderstood the instructions.

Procedures and Materials

The experiment was administered during audit training programs conducted by the participating firms. Subjects received general oral instructions at the start of the experiment and then followed written instructions as they completed the rest of the experiment. Subjects were not allowed to return to previously completed parts of the experiment while completing subsequent parts of the experiment. They worked at their own pace and were not allowed to use reference materials or to confer with other participants at any time during the study. It took subjects approximately 40 minutes to complete the experimental tasks.

Subjects were randomly assigned to one of the three treatment conditions. Subjects in the Positive condition were asked to explain an increase in the Finished Goods Inventory account, which, by design, required subjects to process facts from the case materials that reflected positively on the company's ability to continue as a going concern. For example, the company description and financial statements included facts such as: a new customer signed a significant long-term contract, delivery of the first order to the new customer will occur shortly after the end of the year, and an upgraded production system that has improved the flow of inventory and minimizes defects and costs.

Subjects in the Negative condition were asked to explain the increase in the Long-Term Notes Payable account, which, by design, required subjects to process facts from the case materials that reflected negatively on the company's ability to continue as a going concern. For example, the company description and financial statements included facts such as: negative cash flows, cash shortages, a large out-of-court cash settlement of a civil suit filed against the company by a customer, and increasing interest costs. As indicated earlier, subjects in the Control condition were not asked to perform any specific task while reading the company description or reviewing the financial statements. Instead, they were asked only to read the information carefully so that they could answer questions regarding the company later in the study.

Subjects were told that the experiment would be administered in two parts. In Part 1, subjects in all three conditions read the company description and reviewed the financial statements, and subjects in the Positive and Negative conditions performed their other tasks. Upon completion of Part 1, all materials and responses were collected, and subjects were reminded not to discuss the study with anyone before completing Part 2 of the experiment later in the day. The purpose of the delay was to simulate audit practice where a going-concern judgment may not be made until some time after the auditor has performed other audit tasks.

Although no specific mention was made of the subsequent going-concern judgment or recall task during the administration of Part 1, subjects in all conditions were told to assume the role of the supervising senior on the audit at the start of Part 1 and understood that they would be completing Part 2 of the experiment later in the day. This is consistent with the actual audit environment in which auditors are not explicitly reminded to consider going-concern issues every time they perform other audit tasks. Rather, the apparent presumption (in practice as well as in SAS No. 59) is that, because of their training and level of responsibility on the audit, supervising seniors will naturally attend to the relevant information and store it for later use in making a going-concern judgment. Because one aspect of our study was to examine how well seniors do this, it was important that our experimental procedures allow for this possibility, while at the same time not induce subjects to pay more attention to going-concern information than they normally would while performing other audit tasks. Indeed, explicitly informing subjects that they would be required to make a going-concern judgment in Part 2 of the experiment might even have caused subjects to make their going-concern judgments on-line as they read the case information during Part 1. As discussed earlier, in actual audit settings it is unlikely that seniors make their going-concern judgments on-line while simultaneously performing another audit task.

In Part 2 of the experiment, subjects (1) performed a memory task, and (2) judged the probability that the company would continue as a going concern. In the memory task, subjects were asked to recall information about the company and the financial statements, as well as any inferences they had drawn, that related to the company's ability to continue as a viable operation in the following year.[4] They listed the items they recalled in spaces provided in the experimental booklet. For each item they listed, subjects indicated whether they thought the item suggested that the company would (W) or would not (WN) continue as a viable operation.[5] The proportion of positive items (W/[W+WN]) recalled by subjects provides the memory measure used in this study. Comparison of this memory measure across the three Other Task conditions provides a test of H1a and H1b.

Subjects indicated their probability judgment that the company would continue as a going concern in the coming year on a 100-point scale, with end points labeled "Definitely *Will Not* Continue as a Viable Operation," and "Definitely *Will* Continue as a Viable Operation." A comparison of these probability judgments across the three Other Task conditions provides a test of H2a and H2b. Examining whether the memory measure is causally related to subjects' going-concern judgments provides a test of H3a and H3b.

Subjects were not provided with the case materials from Part 1 when making their going-concern judgments in Part 2 for several reasons. As with most experiments, time constraints made it necessary to limit the amount of information provided to subjects in Part 1 to considerably less than the amount available in actual audit settings. Consequently, if subjects had been given access to the case materials from Part 1 when making their going-concern judgment in Part 2, they could have fully reviewed all of the original source materials. This would be inconsistent with practice, where it is simply not practical for auditors to reexamine the vast amount of original source material when making subsequent judgments (for related discussions, see Libby and Trotman 1993; Sprinkle and Tubbs 1998; Ricchuite 1999).[6] Therefore, providing subjects with the original case materials when making their going-concern judgments would have encouraged subjects to behave in a manner inconsistent with actual audit practice.

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[4] Subjects were asked to include their inferences because of the important role that inferences appear to play in the judgment process (Greenwald 1968; Lingle and Ostrom 1979; Hastie and Pennington 1989; Moser 1992). Greenwald (1968) argues that an individual's cognitive response to a persuasive message determines the message's impact on a judgment. Moser (1992) points out that many of the previous studies that failed to find a relationship between memory and judgment did not examine individuals' cognitive responses or inferences. He demonstrates that a list of arguments generated by subjects at the time they make their judgment is a better measure of memory than the traditional recall measure which only reflects subjects' recall of original stimulus materials (raw facts). Other studies that used some form of self-generated memory measures have also found significant associations between memory and judgment (e.g., Hoch 1984; Anderson et al. 1985; Moser 1989).

[5] Subjects were asked to code items they listed as either "W" (will continue) or "WN" (will not continue) because it is *their* interpretation of information or cognitive response to information (Greenwald 1968) that determines how the information impacts their going-concern judgment.

[6] In addition, Moeckel and Plumlee (1989) have provided evidence that overconfidence in inaccurate and incomplete memories can cause auditors to rely on those memories rather than refer back to the workpapers or original source material. Recently, Sprinkle and Tubbs (1998) extended Moeckel and Plumlee's (1989) work, providing evidence that the accuracy of auditors' recall is positively related to audit risk and the importance of the information, and that auditors' self-reported likelihood of referring back to workpapers is higher for items of greater importance. We consider further the possible impact of allowing subjects to refer back to workpapers or other source material in the discussion section of the paper.

Another reason for not allowing subjects access to the original source materials when making their going-concern judgments was that doing so would have made it impossible to examine the potential effects of memory on judgment. Had the case materials been provided, we would have been unable to determine whether subjects' going-concern judgments were based on information retrieved from memory or information obtained from a re-examination of the original materials. In contrast, our design provides a clean test of whether the memory effects resulting from performing other audit tasks influence subjects' subsequent going-concern judgments.

The order in which subjects completed the memory and judgment tasks was varied (recall followed by judgment or judgment followed by recall) to ensure that our findings do not depend on the order of data collection. Because the order of data collection did not affect either subjects' going-concern judgments or the association between subjects' memory and their going-concern judgments, we report our findings without further consideration of the order manipulation.[7]

After completing Part 2 of the experiment, subjects completed an item-recognition task and a post-experimental questionnaire. The item-recognition task required subjects to indicate whether the general meaning of 16 sentences was included in the description of the company they read in Part 1 of the experiment. The general meaning of eight of these 16 sentences was included in the description. Four of these eight sentences related to the Positive condition and four related to the Negative condition. The general meaning of the remaining eight sentences was not included in the description of the company. The purpose of the item-recognition task was to determine whether subjects read all of the information provided to them, as opposed to just the information that related to their specific other task. The post-experimental questionnaire collected background information about the subjects, to ensure that they had the appropriate level of experience to perform the experimental tasks. Completion of the post-experimental questionnaire marked the conclusion of subjects' participation in the experiment.

IV. RESULTS

Hypotheses 1a and 1b: Other Task Effects on Memory

The first pair of hypotheses investigates whether personally performing another audit task biases seniors' memory of going-concern information. For each item subjects were able to recall, they indicated whether the item suggested the company would (W) or would not (WN) continue as a going concern. Table 1 reports mean Memory Measures for the three Other Task conditions, where Memory Measure is the proportion of positive items ($W/[W + WN]$) recalled by subjects. An ANOVA was performed with Memory Measure as the dependent variable and Other Task as the independent factor. Consistent with H1a, results indicate that Other Task had a significant effect on subjects' memory ($F = 6.78$, $p = .002$). Additional analysis indicates that subjects in the Positive condition (mean = .67) recalled a significantly higher proportion of positive items than subjects in both the Control condition (mean = .54; $t = 3.11$, $p = .004$) and the Negative condition (mean = .51; $t = 3.33$, $p = .002$). The proportion of positive items recalled by subjects in the Negative condition and the Control condition are statistically indistinguishable ($t = .67$, $p > .53$),[8] suggesting that, in the absence of a processing objective that directs their attention elsewhere, experienced auditors attend to the same amount of negative information as auditors performing a task that directs their attention toward negative information. Indeed the mean numbers of negative items recalled in the Negative (3.45 items) and Control (3.95 items) conditions are not significantly different ($t = 1.2$, $p > .23$).

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[7] The mean going-concern judgments were the same (.72) for both the recall then judgment and the judgment then recall condition. The association between memory and judgment was statistically significant ($p < .05$) in both the recall then judgment and the judgment then recall conditions.

[8] Although all of the reported comparisons were planned, we repeated the Memory Measure comparisons using the Tukey method for *post hoc* multiple comparisons. The results were consistent with the t-tests reported in the paper. That is, Positive condition memory measures were significantly higher than both Control condition memory measures ($p < .05$) and the Negative condition memory measures ($p < .01$), but Negative condition memory measures were statistically indistinguishable from Control condition memory measures.

Hypotheses 2a and 2b: Other Task Effects on Going-Concern Judgments

The second pair of competing hypotheses investigate whether the other task that subjects performed affected their subsequent going-concern judgments. Table 1 presents the mean going-concern judgments for the three Other Task conditions. An ANOVA was performed with subjects' going-concern judgments (Judgment) as the dependent measure and Other Task as the independent factor. The results are consistent with H2a. That is, Other Task had a significant effect on Judgment ($F = 3.86$, $p = .024$). Additional analysis indicates that going-concern judgments in the Positive condition (Mean = .78) were significantly higher ($t = 2.68$, $p = .009$) than those in the Control condition (Mean = .69). Going-concern judgments in the Positive condition were also significantly higher ($t = 2.08$, $p = .041$) than those in the Negative condition (Mean = .70). However, going-concern judgments in the Negative condition were statistically indistinguishable ($p>.67$) from those in the Control condition.[9] This pattern of results is the same as the pattern of results for memory and as such provides additional evidence that, in the absence of a specific processing objective that directs their attention elsewhere, experienced auditors attend to the same amount of negative information as they do when they perform a task that directs their attention to negative information.

Hypotheses 3a and 3b: The Causal Relation Between Memory and Judgment

Panel A of Figure 1 illustrates a judgment process proposed by Shedler and Manis (1986). In this process, an antecedent condition independently affects both memory and judgment, but memory is not causally related to judgment. In the context of the present study, this model predicts that the antecedent condition (Other Task) independently biases both subjects' memory (Memory Measure) and their going-concern judgments (Judgment), but memory (Memory Measure) is not causally related to subjects' going-concern judgments (Judgment). Panel A of Figure 1 also illustrates an alternative judgment process sometimes referred to as the availability model (Shedler and Manis 1986; Moser 1992). In this process, performing the other audit task (Other Task) biases memory (Memory Measure), which in turn biases subjects' going-concern judgments (Judgment), and as such memory (Memory Measure) is causally related to subjects' going-concern judgments (Judgment).

Recall that tests of H2a and H2b indicated that seniors' going-concern judgments were biased by the other task that they performed. An ANCOVA was performed to examine whether the other task biased the seniors' going-concern judgments directly, or the other task biased memory, which in turn biased the going-concern judgments. The dependent variable was Judgment and the independent factors were Other Task and Memory Measure

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[9] We repeated the tests using the Tukey method for *post hoc* multiple comparisons. As was the case for the Memory Measure comparisons, the results were consistent with the t-tests reported in the paper. That is, Positive condition judgments were significantly higher than Control condition judgments ($p < .05$) and marginally significantly higher than Negative condition judgments ($p < .10$), but Negative condition judgments were statistically indistinguishable from Control condition judgments.

TABLE 1
Mean Number of Items Recalled, Memory Measures,[a] and Going-Concern Judgments

Other Task Condition	*n*	*Positive Items Recalled*	*Negative Items Recalled*	*Total Items Recalled*	*Memory Measures*	*Going-Concern Judgments*
Positive	40	4.38	2.45	6.83	.67	.78
Control	40	4.60	3.95	8.55	.54	.69
Negative	40	3.60	3.45	7.05	.51	.70

[a] Memory Measure was calculated for each subject as the proportion of positive items (W/[W + WN]) listed by that subject. The mean Memory Measure reported for each of the three Other Task conditions is the average of the individual subjects' Memory Measures in that condition. This mean Memory Measure will not necessarily be the same as a measure calculated using the mean positive and mean negative items reported in the table because the impact of the difference across individuals is not captured in the latter calculation.

(the covariate).[10] If performing the other task independently biased both memory and the going-concern judgment, Other Task should continue to have a significant effect on Judgment and the effect of the covariate (Memory Measure) on Judgment should be nonsignificant. However, if performing the other task biased memory, which in turn biased the going-concern judgment, the effect of Other Task on Judgment should drop to nonsignificance and the covariate (Memory Measure) should be significantly related to Judgment.

Panel B of Figure 1 reports the results of the ANCOVA. The effect of Other Task on Judgment dropped to nonsignificance, ($F = 1.37$, $p > .25$), and the effect of Memory Measure on Judgment was significant ($F = 16.47$, $p < .001$). These results support H3a and are consistent with a decision process in which seniors' biased memory leads to their biased going-concern judgments.

Additional Analysis

Tests of subjects' performance on the item-recognition task provide evidence that the results reported above were not caused by subjects reading only that information that was relevant to their other audit task. Subjects performed quite well on the item-recognition task, misclassifying on average only 1.6 out of the 16 sentences presented to them. The number of items misclassified did not differ across the three Other Task conditions ($F = .790$, $p > .456$). To examine whether the type of item (Positive condition item or Negative condition item) subjects misclassified differed across the three Other Task conditions, we conducted separate tests by type of item misclassified.[11] There is no significant difference in either the number of Positive condition items ($F = .832$, $p = .44$) misclassified or the number of Negative condition items misclassified ($F = .014$, $p = .99$) across the three Other Task conditions. These results indicate that subjects' biased going-concern judgments were not the result of subjects reading only that information that was relevant to their other task. Rather, it appears that subjects read all the information presented to them. However, subjects apparently attended more fully to the information that was relevant to the other

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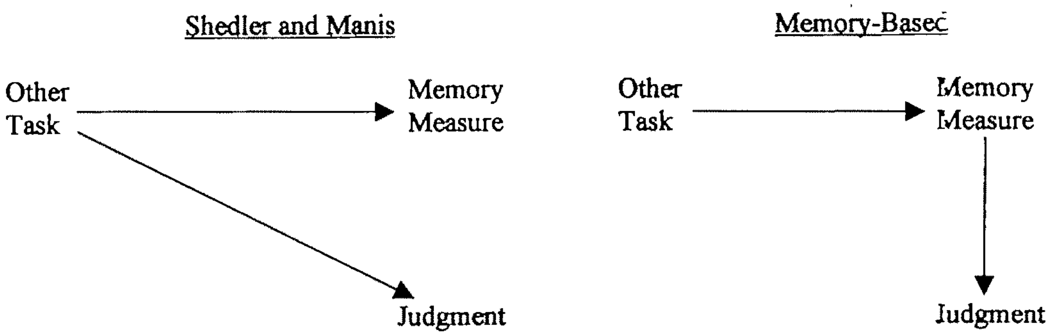
[10] In the ANCOVA, the effects of Other Task and Memory Measure are assessed simultaneously, with each effect assessed for its partial contribution.

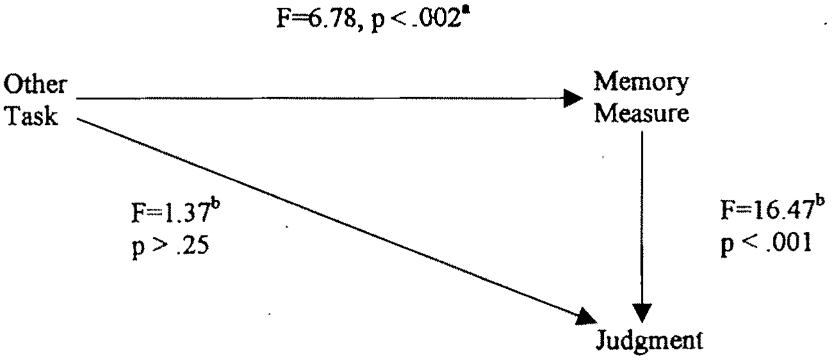
[11] A Positive condition item is an item associated with the explanation for the increase in Finished Goods Inventory and a Negative condition item is an item associated with the explanation for the increase in Long-Term Notes Payable.

FIGURE 1
Causal Processing Analysis

Panel A: Alternative Processing Models



Panel B: Results of the Causal Analysis



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[a] This F-statistic and the associated p-value are from an ANOVA with Memory Measure as the dependent variable and Other Task as the independent variable.

[b] These F-statistics and associated p-values are from an ANCOVA with Judgment as the dependent measure and Other Task and Memory Measure (covariate) as independent variables.

task (i.e., their immediate processing objective). Consequently, this biased subset of the information was retrieved from long-term memory when subjects made their memory-based going-concern judgments.

V. DISCUSSION

The results of this study suggest that performing other audit tasks can bias seniors' subsequent going-concern judgments. When provided with identical information, seniors who performed another task for which the underlying facts reflected positively (negatively) on the company's ability to continue as a going concern, subsequently made going-concern judgments that were relatively more positive (negative).

A variety of previous studies have found that auditors attend more to negative information (e.g., Kida 1984; Trotman and Sng 1989; Asare 1992). This has been described as a conservative processing strategy (Smith and Kida 1991). We find some evidence of such a strategy in that subjects who were not provided with a specific processing objective attended to the same amount of negative information as those who performed a task that directed their attention toward negative information in the case. However, the results for subjects who performed another task that directed their attention toward positive information in the case (i.e., the Positive condition) are inconsistent with a conservative processing strategy. In this condition, subjects attended less to negative information, and consequently both their memory and their judgments were more positive than those of subjects in either the Negative or Control conditions. Of course, our data do not rule out the possibility that the effects of performing the other audit task in this condition were partially offset by a conservative processing strategy. However, the results for this condition demonstrate clearly that the effects of performing the other task dominated any general tendency toward conservative information processing.

According to SAS No. 59, no audit procedures are required solely for the purpose of evaluating the firm's ability to continue as a going concern. Rather, the auditor need only consider whether the results of other standard audit procedures raise substantial doubt about the firm's viability. If the auditor believes there is substantial doubt after performing standard audit procedures, additional evidence that supports or mitigates this belief should be gathered. However, if there is no substantial doubt after performing the standard audit procedures, no additional search for information related to the firm's viability is required.

The results of this study suggest the possibility that these requirements are inadequate. Seniors' biased recall could influence their conclusions regarding substantial doubt, and as such could affect whether there is additional information search. The problem is likely to be most significant when the supervising senior performs standard audit tasks that relate positively to the firm's viability. If the senior is biased against concluding that there is substantial doubt, this bias may not be offset by additional information search because, under these conditions, the standard does not require such additional search.

In contrast, when the supervising senior performs standard audit tasks that relate negatively to the firm's viability, and he or she is biased toward concluding there is substantial doubt, the bias may be offset by the additional information search required under the standard. However, the initial bias regarding substantial doubt would nevertheless result in inefficiency even if additional evidence subsequently mitigates the auditor's doubts about viability.

One possible way to overcome such potential problems would be to design and implement a decision aid. As explained above, seniors' biased going-concern judgments appear to be the result of biased memory. Developing and providing an external memory aid (Kennedy 1995) might help reduce the auditor's need to rely on long-term memory, and thereby potentially reduce any bias in going-concern judgments.

Although this study increases our understanding of how going-concern judgments are made and the factors that can affect such judgments, the conclusions that can be drawn are limited somewhat because subjects were not allowed to return to the original source materials when making their going-concern judgments. As explained earlier, allowing subjects to have access to the complete set of source materials would have been inconsistent with practice and have made testing our hypotheses regarding the effects of memory on seniors' going-concern judgments problematic. Nevertheless, in actual audits, seniors do have access to at least a subset of the source materials in the form of audit workpapers and they could selectively return to such materials when making the going-concern judgment. However, it is not at all clear that, given the opportunity, seniors would return to workpapers or source materials, or what effect doing so would have on their judgments. As Libby and Trotman (1993) explain, efficiency concerns often cause auditors to rely on memory rather than revisit workpapers; and even when workpapers are re-examined, the process of searching for information in the workpapers is likely to be influenced by the seniors' currently held views and the related facts in memory. So it remains an open question as to whether providing auditors with access to workpapers or other source materials would mitigate or exacerbate the effects reported in this study; thus, this issue would appear to warrant additional research.

Another potential limitation arises because the auditors participating in the study were not explicitly told that they would be making a going-concern judgment before they performed their other audit task. As discussed earlier, this approach reflected our concern that explicitly informing subjects of the up-coming going-concern judgment would induce them to pay more attention to going-concern information than they normally would in actual audit settings where no such explicit reminder is provided before they perform another audit task. However, it is also possible that our approach had the opposite effect, resulting in subjects paying less attention to going-concern information than they would in actual audit setting, and thereby inflating our reported experimental effects.

Many questions regarding going-concern judgments remain unanswered. For example, given findings regarding the benefits of the review process (e.g., Libby and Trotman 1993) and other findings suggesting that the review process may not eliminate biases in seniors' going-concern judgments (e.g., Ricchiute 1999), further investigation of the effects of the review process are clearly necessary. Rich et al. (1997b) provide an extensive review of the existing literature on the review process and suggest promising areas for future research. Also, it is not clear whether the type of conservative information-processing strategy documented in earlier research is optimal for going-concern judgments. Smith and Kida (1991) suggest that auditors are conservative in their information processing because of the potentially serious consequences of their judgments, such as legal liability to third parties for issuing a clean opinion for a firm that subsequently declares bankruptcy. However, a conservative processing strategy can lead to costly inefficiencies. To the extent that auditors initially overestimate the likelihood that a firm may not continue as a going concern because they attend more fully to negative information than positive information, audit firms may be conducting unnecessary and costly procedures. Future research could investigate how auditors deal with this difficult trade-off between inefficiencies and their concerns regarding legal liability when making going-concern judgments.

REFERENCES

American Institute of Certified Public Accountants (AICPA). 1988. *The Auditor's Consideration of an Entity's Ability to Continue as a Going Concern.* Statement on Auditing Standards No. 59. New York, NY: AICPA.

Anderson, C., B. New, and J. Speer. 1985. Argument availability as a mediator of social theory perseverance. *Social Cognition* 3: 235–249.

Asare, S. 1990. The auditor's going-concern decision: A review and implications for future research. *Journal of Acçounting Literature* 9: 39–64.

———. 1992. The auditor's going-concern decision: Interaction of task variables and the sequential processing of evidence. *The Accounting Review* 67: 379–393.

Bargh, J. 1984. Automatic and conscious processing of social information. In *Handbook of Social Cognition,* Vol. 3, edited by R. Wyer, and T. Srull. Hillsdale, NJ: Erlbaum.

Chen, K., and B. Church. 1992. Default on debt obligations and the issuance of going-concern opinions. *Auditing: A Journal of Practice & Theory* 11: 30–49.

Choo, F., and K. Trotman. 1991. The relationship between knowledge structure and judgments for experienced and inexperienced auditors. *The Accounting Review* 66: 464–485.

Chow, C., A. McNamee, and R. Plumlee. 1987. Practitioners' perceptions of audit step difficulty and criticalness: Implications for audit research. *Auditing: A Journal of Practice & Theory* 6: 123–133.

Davis, E., and R. Ashton. 1995. Going concern evaluation: Auditors' derived substantial doubt thresholds. Working paper, Duke University.

Emby, C., and M. Gibbins. 1988. Good judgment in public accounting: Quality and justification. *Contemporary Accounting Research* 4 (Spring): 287–313.

Fazio, R. 1986. How do attitudes guide behavior? In *Handbook of Motivation and Cognition: Foundations of Social Behavior*, edited by R. Sorrentino, and E. Higgins. New York, NY: The Guilford Press.

———. 1990. Multiple processes by which attitudes guide behavior: The mode model as an integrative framework. In *Advances in Experimental Social Psychology*, Vol. 23, edited by M. Zanna. San Diego, CA: Academic Press Inc.

Gibbins, M. 1984. Propositions about the psychology of professional judgment in public accounting. *Journal of Accounting Research* 22: 103–125.

Greenwald, A. G. 1968. Cognitive learning, cognitive response to persuasion, and attitude change. In *Psychological Foundations of Attitudes*, edited by A. Greenwald, T. Brock, and T. Ostrom. New York, NY: Academic Press.

Hastie, R., and B. Park. 1986. The relationship between memory and judgment depends on whether the judgment task is memory-based or on-line. *Psychological Review* 93: 258–268.

———, and N. Pennington. 1989. Notes on the distinction between memory-based vs. on-line judgments. In *On-line Cognition in Person Perception*, edited by J. N. Bassili. Hillsdale, NJ: Erlbaum.

Heiman, V. 1990. Auditors' assessments of the likelihood of error explanations in analytical review. *The Accounting Review* 65: 875–890.

Hirst, D., and L. Koonce. 1996. Audit analytical procedures: A field investigation. *Contemporary Accounting Research* 13: 457–486.

Hoch, S. 1984. Availability and interference in predictive judgment. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 10: 649–662.

Kennedy, J. 1993. Debiasing audit judgment with accountability: A framework and experimental results. *Journal of Accounting Research* 51: 231–245.

———. 1995. Debiasing the curse of knowledge in audit judgment. *The Accounting Review* 70: 249–273.

Kida, T. 1984. The impact of hypothesis-testing strategies on auditors' use of judgment data. *Journal of Accounting Research* 22: 332–340.

Koonce, L., U. Anderson, and G. Marchant. 1995. Justification of decisions in auditing. *Journal of Accounting Research* 33: 369–384.

Langer, E. 1978. Rethinking the role of thought in social interaction. In *New Directions in Attribution Research*, Vol. 2, edited by J. Harvey, W. Ickes, and R. Kidd. Hillsdale, NJ: Erlbaum.

Libby, R., and K. Trotman. 1993. The review process as a control for differential recall of evidence in auditor judgments. *Accounting, Organizations and Society* 18: 559–574.

Lingle, J., and T. Ostrom. 1979. Retrieval selectivity in memory-based impression judgments. *Journal of Personality and Social Psychology* 37: 180–194.

Louwers, T. 1998. The relation between going-concern opinions and the auditors' loss function. *Journal of Accounting Research* 36: 143–156.

McKeown, J., J. Mutchler, and W. Hopwood. 1991. Towards an explanation of auditor failure to modify the audit opinions of bankrupt companies. *Auditing: A Journal of Practice & Theory* (Supplement): 1–13.

Moeckel, C., and R. Plumlee. 1989. Auditors' confidence in recognition of audit evidence. *The Accounting Review* 64: 653–666.

Moser, D. 1989. The effects of interference, availability, and accounting information on investors' predictive judgments. *The Accounting Review* 64 (October): 433–448.

———. 1992. Does memory affect judgment? Self-generated vs. recall memory measures. *Journal of Personality and Social Psychology* 62: 555–563.

Raghunandan, K., and D. Rama. 1995. Audit reports for companies in financial distress: Before and after SAS No. 59. *Auditing: A Journal of Practice & Theory* 14: 50–63.

Ricchiute, D. 1992. Working-paper order effects and auditors' going-concern decisions. *The Accounting Review* 67: 46–58.

———. 1999. The effect of audit seniors' decisions on working paper documentation and on partners' decisions. *Accounting, Organizations and Society* 24 (February): 155–171.

Rich, J., I. Solomon, and K. Trotman. 1997a. The audit review process: A characterization from the persuasion perspective. *Accounting, Organizations and Society* 22 (5): 481–505.

———, ———, and ———. 1997b. Multi-auditor judgment/decision making research: A decade later. *Journal of Accounting Literature* 16: 86–126.

Schneider, W., and R. Shiffrin. 1977. Controlled and automatic human information processing: I. Detection, research, and attention. *Psychological Review* 84: 1–66.

Shedler, J., and M. Manis. 1986. Can the availability heuristic explain vividness effects? *Journal of Personality and Social Psychology* 51: 26–36.

Sherman, S., K. Zehner, J. Johnson, and E. Hirt. 1983. Social explanation: The role of timing, set, and recall on subjective likelihood estimates. *Journal of Personality and Social Psychology* 44: 1127–1143.

Smith, J., and T. Kida. 1991. Heuristics and biases: Expertise and task realism in auditing. *Psychological Bulletin* 109: 472–489.

Sprinkle, G., and R. Tubbs. 1998. The effects of audit risk and information importance on auditor memory during working paper review. *The Accounting Review* 73 (October): 475–502.

Tan, H. 1995. Effects of expectations, prior involvement, and review awareness on memory for audit evidence and judgment. *Journal of Accounting Research* 33: 113–135.

Trotman, K., and J. Sng. 1989. The effect of hypothesis framing, prior expectations and cue diagnosticity on auditor's information choice. *Accounting, Organizations and Society* 14: 565–576.

Wyer, R., and T. Srull. 1989. *Memory and Cognition in its Social Context,* Hillsdale, NJ: Erlbaum.

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Revisiting the Relation between the Default Risk of Debt and the Earnings Response Coefficient

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ABSTRACT: Theory suggests that earnings response coefficients (ERCs) are positively associated with expected earnings growth and negatively associated with equity risk. Dhaliwal and Reynolds (1994) (DR) hypothesize that equity beta fails to capture a default risk component of equity risk and demonstrate that ERCs are negatively associated with two measures of default risk—bond ratings and debt/equity ratios—in a regression model that contains equity beta. Bond ratings and debt/equity ratios are associated with expected earnings growth. This paper examines how the association between ERCs and default risk is impacted by the inclusion of expected earnings growth in the model. The relation between ERCs and bond ratings is not significant, while the association between ERCs and debt/equity ratios is weakened but is still significant. These findings suggest part of the reason for the negative association between ERCs and default risk in DR is that their default risk proxies also reflect expected earnings growth. In fact, there is no incremental association between ERCs and default risk when equity beta, bond ratings, and expected earnings growth are in the model.

Key Words: *Default risk, Bond ratings, Debt/equity ratio, ERC.*

Data Availability: *Data used in this study are available in public sources that are identified in the study.*

I. INTRODUCTION

Theory and evidence (e.g., Collins and Kothari 1989) suggest that earnings response coefficients (ERCs) are positively associated with expected earnings growth and negatively associated with systematic risk. Dhaliwal and Reynolds (1994) (hereafter referred to as DR) find ERCs are negatively associated with two proxies for default risk,

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bond ratings and debt-to-market equity (debt/equity) ratios.[1] Their primary interpretation is that bond ratings (debt/equity ratios) reflect a value-relevant risk not adequately captured by equity beta.[2] However, an alternative interpretation suggested, but not pursued, in DR is that bond ratings (debt/equity ratios) reflect expected earnings growth. This alternative interpretation is plausible since bond-rating agencies indicate that expected earnings growth is an important factor in setting bond ratings (*Standard & Poor's* 1986, 26). This study investigates whether the association between bond ratings (debt/equity ratios) and ERCs is attributable to an association between bond ratings (debt/equity ratios) and expected earnings growth rather than to an association between bond ratings (debt/equity ratios) and an element of equity risk not captured by equity beta.

This study follows DR and assesses the relation between ERCs and a set of potential explanatory variables by estimating the parameters in a regression of earnings changes on abnormal returns modified to allow for different coefficients on each variable assumed to influence the ERC. This study relies on two different measures of expected earnings growth: (1) I/B/E/S analysts' median long-term earnings growth forecasts, and (2) return on equity in excess of a required rate of return. I find that bond ratings are associated with both expected earnings growth measures, after controlling for other factors associated with bond ratings. The major empirical result is that ERCs are associated with bond ratings when expected earnings growth is not included in the regression model, but that ERCs and bond ratings are not associated when expected earnings growth is included in the regression model.

Results regarding debt/equity ratios are not as conclusive. Debt/equity ratios are negatively associated with both earnings growth measures, after controlling for other determinants of debt/equity ratios. However, in the earnings changes–abnormal returns regressions, the relation between ERCs and debt/equity ratios remains significant, though it is reduced, when the earnings growth measures are included in the model.

Studies that examine the factors that influence ERCs are potentially valuable because such studies can increase our understanding of the nature of valuation itself. This study attempted to unravel whether alternative measures of default risk are related to ERCs in the presence of equity beta and expected earnings growth. The results are mixed and this means that it is difficult to provide a clear message to future researchers investigating ERCs. The fact that equity beta and expected earnings growth preempt any role for bond ratings as a potential explainer of ERCs would suggest that future researchers do not need to control for default risk in their attempts to find out more about the determinants of ERCs. However, the fact that equity beta and expected earnings growth do not completely preempt the role of debt/equity ratios as an explainer of ERCs tempers this suggestion. At a minimum, the results here suggest that the incremental role of default risk in explaining ERCs needs to be assessed in the presence of earnings growth. Whether default risk has a role in valuation that is not captured by equity beta and expected earnings growth remains an open issue.

The remainder of this paper is organized as follows. Section II briefly presents the method and variables used, and Section III discusses sample selection and results. Section IV provides concluding remarks.

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[1] Results presented in DR are related to bond ratings. As a validity test, they discuss, but do not tabulate, results obtained by using a debt-to-market equity ratio as an alternative measure of default risk. DR expect that the debt-to-market equity ratio captures default risk, though they discuss reasons that it may do so to a lesser extent than bond ratings.

[2] See Kaplan and Urwitz (1979) for further discussion of why bond ratings may be associated with equity risk.

II. RESEARCH DESIGN

The primary analysis of this study focuses on the association between bond ratings (debt/equity ratios) and ERCs. This relationship is reexamined using the reverse regression approach suggested by Collins and Kothari (1989) and used by DR.[3]

$$\begin{aligned} \text{CHGEPS} = {} & \alpha_0 + \alpha_1\text{CAR} + \alpha_2\,(\text{CAR*BETA}) + \alpha_3(\text{CAR*PERS}) \\ & + \alpha_4\,(\text{CAR*RATE or LDME}) \\ & + \alpha_5\,(\text{CAR*ANLTG}) + \alpha_6\,(\text{CAR*XROE}) + e \end{aligned} \tag{1}$$

where:[4,5]

CHGEPS = the change in annual earnings per share (EPS), before extraordinary items and discontinued operations, scaled by price (P) at the end of year t − 1 $[(EPS_t - EPS_{t-1})/P_{t-1}]$;

CAR = twelve-month, cumulative abnormal returns beginning the fourth month after the start of fiscal year t;[6]

BETA = the market model coefficient estimated using the equal-weighted market portfolio and stock returns over 36 months up to the end of year t − 1;

PERS = earnings persistence, measured as $(1 - \theta)$, where θ is the MA parameter from estimating an IMA(1,1) model using the firm's earnings series across the 1977–1996 period;

RATE = the *Standard & Poor's* Senior Bond Rating in year t − 1;[7]

LDME = log of (total debt divided by market value of equity) at the end of year t − 1;[8]

ANLTG = the most recent I/B/E/S analysts' median long-term earnings growth forecast in year t − 1;

XROE = excess return on book equity for year t − 1 (income before extraordinary items and discontinued operations in year t divided by the book value of equity at the end of year t − 1 less the required rate of return).

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[3] The reverse regression has been suggested as a procedure for mitigating potentially severe measurement error in the earnings expectation (Beaver et al. 1987).

[4] Time and firm subscripts are suppressed.

[5] For all models, separate yearly regressions are estimated. Parameter estimates reported in the tables are the sample mean of the parameter estimates from the yearly cross-sectional regressions, and the t-statistics are calculated from the standard error of the sampling distribution of parameter estimates.

[6] CARs are obtained by first estimating the market model (log form) using equal-weighted market returns. Firms must have at least 20 monthly returns over the 36 months preceding the beginning of the fiscal year to be included in the sample for a particular year. Two measures of CAR are examined: $\Sigma_{i=1}^{12} \ln(1 + ar_i)$ and $\Pi_{i=1}^{12}(1 + ar_i) - 1$, where ar is the monthly abnormal stock return. The log form helps to mitigate skewness in the sample monthly returns and is the form used for reporting purposes. However, results are qualitatively similar using either measure.

[7] RATE is defined such that greater values indicate lower bond ratings. Positive values are assigned to RATE (AAA = 1,...,B = 6) and used in ordered probit analysis discussed in Section III. However, the median value of RATE is subtracted from RATE before estimating equation (1). This means that α_1, the coefficient for CAR, can be interpreted as the marginal influence between earnings and abnormal returns for a firm with the median debt rating. The estimates of the other coefficients, including α_4 for RATE relative to using the AAA = 1,...,B = 6 scale, are unaltered. DR report results based on using an indicator variable, BRAT, set equal to 1 when the bond rating is lower than BBB+ and zero otherwise. They indicate that qualitatively similar results are obtained using actual ratings. RATE is used in this study to maintain consistency with the specification in later analysis. Qualitatively similar results are obtained using BRAT.

[8] The log transformation is applied to mitigate skewness in the sample debt-to-market equity ratios (DME). Qualitatively similar, though weaker, results are obtained using DME.

The reduced form of equation (1) excluding ANLTG and XROE is similar to DR's empirical model (equation 6) and is estimated first. In the reverse regression, the relationships are inverted and the signs of the coefficients (other than α_1 on CAR) are opposite those in the regression in which CAR is the dependent variable and CHGEPS is one of the independent variables. Consistent with results in DR, positive coefficients are expected for BETA and RATE (LDME), and a negative coefficient is expected for PERS.

Equation (1) is then estimated after including ANLTG and XROE to assess the effect of including measures of expected earnings growth on the coefficient for RATE (LDME). Prior studies have suggested an association between financial analysts' long-term earnings growth forecasts (ANLTG) and investors' earnings growth expectations (LaPorta 1996; Abarbanell and Bushee 1997). However, results in some studies also suggest that financial analysts' earnings expectations are not complete measures of investors' expectations and that other financial measures appear relevant to the formation of investors' expectations.[9] This study considers a second measure of expected earnings growth, excess return on equity (XROE), calculated as the rate of return on equity in excess of a required rate of return. This variable is included in what has been labeled the Edwards-Bell-Ohlson valuation formula as an important factor related to firm value (Edwards and Bell 1961; Ohlson 1995).[10] Excess return on equity can arise because of a firm's positive growth opportunities. If there is stability in a firm's growth opportunities, then current XROE is expected to reflect future earnings growth, suggesting that XROE may be relevant to investors for forming earnings growth expectations (White et al. 1998, 1051).[11]

There is little consensus in practice on how to determine the excess rate of return on equity (the actual return less the required rate of return). Feltham and Ohlson (1999) suggest that, in theory, the excess rate of return should be found by dividing a risk-adjusted dollar amount of earnings by the beginning book value of equity and subtracting the risk-free rate of interest from this quotient. However, in practice, there is no obvious way to risk-adjust the dollar amount of earnings. Consequently, in practice, risk adjustments are either ignored or made in a theoretically *ad hoc* fashion by finding a firm-specific, risk-related required rate of return. This study considers two measures of the excess rate of return: (1) actual book rate of return less the one-year U.S. Treasury bond rate (RFREE) and (2) actual book rate of return less a variable rate, measured as the product of the firm's beta estimate and the market portfolio return. Measure (1) is equivalent to ignoring risk adjustments while (2) is a theoretically *ad hoc* approach to implementing risk adjustments.[12]

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[9] Studies find an association between announcement-period returns and earnings forecast errors based on time-series earnings expectations incremental to analysts' earnings forecast errors, suggesting measurement error in financial analysts' earnings expectations relative to market expectations (Brown et al. 1987; Leftwich and Zmijewski 1994). Additionally, Abarbanell and Bushee (1997) find that stock returns are associated with other financial measures related to future earnings after controlling for contemporaneous earnings changes and financial analysts' earnings growth forecasts. Abarbanell and Bushee (1997, 2) suggest that analysts are inefficient in impounding in their earnings forecasts relevant information about future earnings contained in financial data and that investors recognize that fact.

[10] These ideas appeared earlier in Preinreich (1938) and also in Peasnell (1982).

[11] Both XROE of the prior period and CHGEPS can reflect expected future growth. However, I expect that XROE reflects differences in the spread between the profit rate on existing net assets and a normal rate of return more directly than CHGEPS. The simple (Spearman) correlation between XROE and CHGEPS of −0.161 does not suggest redundancy of information content between XROE and CHGEPS. The simple correlations between ANLTG and CHGEPS (0.052) and ANLTG and XROE (0.238) provide further confidence that XROE reflects different aspects of expected future growth than does CHGEPS.

[12] Results in all regressions are qualitatively similar when either measure is used. Results presented are based on RFREE.

Negative coefficients are expected for ANLTG and XROE, consistent with a positive association between ERCs and expected earnings growth. To the extent that bond ratings and/or debt/equity ratios reflect expected earnings growth, the coefficients on RATE and/or LDME will be reduced after including ANLTG and XROE.

III. RESULTS

Sample Selection and Description

The sample is composed of firms with the required data drawn from the annual Compustat primary, secondary, tertiary, full coverage, and research database, monthly CRSP database, and I/B/E/S Summary Estimates database. To estimate earnings persistence, firms were required to have earnings per share (EPS) and adjustment factor data, and no change to fiscal year-end over the 1977–1996 period, resulting in an initial sample of 1,444 firms. Eliminating firms not included in the CRSP and I/B/E/S databases reduced the initial sample by 107 and 167 firms, respectively. For any estimation year, firms were also required to have senior bond-rating, total debt, stock price, number of common shares, and book equity data available on the Compustat tapes, sufficient return data on the CRSP tape for estimating return and beta variables, and I/B/E/S analysts' median long-term earnings growth forecasts. Application of these latter restrictions and deletion of outliers, defined as values below the first percentile and greater than the 99th percentile, resulted in final samples of 4,045 and 8,620 firm-year observations for the 1986–1996 bond-rating and 1982–1996 debt/equity samples, respectively.[13]

Table 1 provides descriptive summary statistics for the variables used to estimate equation (1) as well as for variables used in additional analyses discussed later in this section. Variable means are similar to those reported in other studies examining similar issues and time periods. Similar values are also observed between the bond-rating and debt/equity samples, except for mean total assets of $10.99 billion and $3.16 billion for the bond-rating and debt/equity samples, respectively.

Relating Bond Ratings (Debt/Equity Ratios) and Expected Earnings Growth

Prior to assessing the association between bond ratings (debt/equity ratios) and ERCs, it is important to demonstrate that bond ratings (debt/equity ratios) reflect expected earnings growth. Bond-rating agencies indicate that expected earnings growth is taken into consideration when assigning bond ratings. In particular, they state that a lack of earnings growth potential is considered a weakness (*Standard & Poor's* 1986, 26). Their claim of an association between bond ratings and expected earnings growth is investigated in the following model.

$$\begin{aligned} \text{RATE} = {} & \beta_0 + \beta_1\,\text{ANLTG} + \beta_2\,\text{XROE} + \beta_3\,\text{LTDTA} \\ & + \beta_4\,\text{LTA} + \beta_5\,\text{BETA} + \beta_6\,\text{STDRET} + e \end{aligned} \qquad (2)$$

where:

LTDTA = long-term debt divided by total assets at the end of year t − 1;
LTA = log of total assets at the end of year t − 1;
STDRET = the standard deviation of market model residuals; and

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[13] At the time of the DR study, bond ratings were available on Compustat beginning in 1978. Currently, bond ratings are only available on the Compustat tapes beginning in 1985. The bond ratings sample in this study is slightly larger than the 3,587 firm-year observations from 1978–1988 in DR.

TABLE 1
Summary Statistics and Variable Definitions for Pooled Samples

Panel A: Summary Statistics

	Bond-Ratings Sample (1986–1996) (n = 4045)			*Debt-to-Equity Sample (1982–1996) (n = 8620)*		
Variable	*Mean*	*Std. Dev.*	*Median*	*Mean*	*Std. Dev.*	*Median*
CHGEPS	0.006	0.070	0.007	0.003	0.066	0.006
CAR	−0.023	0.245	−0.022	−0.017	0.272	−0.008
BETA	0.75	0.43	0.76	0.78	0.47	0.79
PERS	0.83	0.50	0.77	0.87	0.51	0.84
RATE	3.20	1.08	3.00	[b]	[b]	[b]
DME[a]	2.67	4.50	1.09	1.06	1.00	0.79
ANLTG	0.10	0.04	0.10	0.12	0.05	0.12
ROE[a]	0.11	0.10	0.12	0.12	0.09	0.12
RFREE[a]	0.06	0.02	0.06	0.08	0.03	0.08
XROE	0.05	0.10	0.06	0.04	0.09	0.05
LTDTA	0.22	0.14	0.22	0.20	0.13	0.19
TA ($B)[a]	10.99	24.54	3.34	3.16	6.09	0.94
STDRET	0.07	0.02	0.06	0.07	0.02	0.07
FXTA	[b]	[b]	[b]	0.91	0.29	0.92
NDTS	[b]	[b]	[b]	0.31	0.21	0.27
RDADX[c]	[b]	[b]	[b]	0.04	0.04	0.03

Panel B: Variable Definitions

CHGEPS = the change in annual earnings per share (EPS), before extraordinary items and discontinued operations, scaled by price at the end of year t − 1.

CAR = twelve-month, cumulative (continuous compounding) abnormal returns, beginning the fourth month after the start of fiscal year t.

BETA = the market model coefficient estimated using the equal-weighted market portfolio, and stock returns over 36 months up to the end of year t − 1.

PERS = earnings persistence measured as (1 − θ) from estimation of an IMA(1,1) model using EPS from 1977–1996.

RATE = the *Standard & Poor's* Senior Bond Rating (AAA rating = 1,...,B rating = 6) for year t − 1.

LDME = log of (total debt divided by market value of equity [DME]) at the end of year t − 1.

ANLTG = the most recent I/B/E/S analysts' median long-term earnings growth forecast in year t − 1.

(*Continued on next page*)

TABLE 1 (Continued)

XROE = excess return on equity, calculated as income before extraordinary items and discontinued operations divided by book value of equity (ROE) at the end of year t − 1 less the average one-year U.S. Treasury bond rate (RFREE) for year t − 1.

LTDTA = long-term debt divided by total assets at the end of year t − 1.

LTA = log of total assets (in billions) at the end of year t − 1.

STDRET = the standard deviation of market model residuals estimated using stock returns over 36 months up to the end of year t − 1.

FXTA = the sum of inventory plus gross plant and equipment divided by total assets at the end of year t − 1.

NDTS = the nondebt tax shield, calculated as the sum of depreciation and amortization expense and investment tax credits divided by the sum of operating income before depreciation, interest, and taxes and nonoperating income/expense at the end of year t − 1.

RDADX = the sum of research and development and advertisement expense divided by net sales revenue for year t − 1.

[a] DME, ROE, RFREE, and TA information is provided only for sample characteristics. In the regressions, the logs of DME and TA (LDME and LTA, respectively) and ROE less RFREE (XROE) are used.

[b] Indicates that a variable is not included in that sample.

[c] Summary statistics for RDADX are for a sample size of 4,475 firm-year observations.

all other variables are as defined earlier. Given the ordinal nature of the dependent variable, RATE, ordered probit is used to estimate equation (2).[14] The control variables in equation (2) are selected based on prior research examining bond ratings (Kaplan and Urwitz 1979; Maher 1987; Ziebart and Reiter 1992). Those studies find a negative coefficient for LTA, and positive coefficients for LTDTA, BETA, and STDRET. ANLTG and XROE are included to assess whether bond ratings are associated with proxies for investors' expectations of earnings growth. Negative coefficients are expected for ANLTG and XROE, consistent with better bond ratings being associated with greater expected earnings growth.

The results, summarized in Table 2 Panel A, show a negative association between RATE and both expected earnings growth measures. This result provides the foundation for suggesting that bond ratings may reflect expected earnings growth in an ERC context. The mean likelihood ratio χ^2 value of 261.1 for the 1985–1995 estimation period indicates a highly significant model goodness-of-fit. This regression also appears well specified in that the coefficients for the control variables are of the predicted sign and significant.[15] In particular, the leverage and risk variables (LTDTA, BETA, and STDRET) all have significantly positive coefficients while the size variable (LTA) has a negative coefficient.

Similar analysis is conducted with respect to debt/equity ratios. Theories of optimal capital structure suggest a negative relationship between debt/equity ratios and growth opportunities (Jensen and Meckling 1976, 337).[16] Myers (1977) shows that high leverage reduces a firm's ability to raise funds to finance positive net-present-value projects. Empirical support for a negative association between debt/equity ratios and future growth is found

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[14] See Kaplan and Urwitz (1979) for a discussion of the merits of ordered probit over other methods in this context.

[15] Multicollinearity diagnostics do not suggest that multicollinearity is problematic in estimating the models of this study.

[16] See Harris and Raviv (1991) for a review of capital structure theories and empirical findings.

TABLE 2
Summary Statistics from Separate Yearly Regressions of Bond Ratings and Debt/Equity Ratios on Expected Growth and Control Variables

Panel A: Bond Rating Results (Probit Regressions)

$$\text{Model: } RATE = \beta_0 + \beta_1\, ANLTG + \beta_2\, XROE + \beta_3\, LTDTA + \beta_4\, LTA + \beta_5\, BETA + \beta_6\, STDRET + e$$

Variable[a]	Predicted Sign	Mean Coefficient Estimate	t-statistic[b]
ANLTG (β_1)	–	−4.290	−5.32***
XROE (β_2)	–	−2.683	−11.71***
LTDTA (β_3)	+	4.387	25.18***
LTA (β_4)	–	−0.190	−10.57***
BETA (β_5)	+	0.676	6.46***
STDRET (β_6)	+	28.075	18.42***

Mean likelihood ratio $\chi^2 = 261.1$ ($p < .0001$)

Panel B: Debt/Equity Results

$$\text{Model: } LDME = \beta_0 + \beta_1\, ANLTG + \beta_2\, XROE + \beta_3\, LTA + \beta_4\, FXTA + \beta_5\, NDTS + \beta_6\, RDADX + e$$

Variable[a]	Predicted Sign	Mean Coefficient Estimate	t-statistic[b]
Intercept (β_0)	(?)	−0.521	−3.88**
ANLTG (β_1)	–	−3.813	−8.26***
XROE (β_2)	–	−3.254	−11.80***
LTA (β_3)	+	0.140	18.87***
FXTA (β_4)	+	−0.424	−8.33
NDTS (β_5)	+	0.610	9.76***
RDADX (β_6)	–	−4.846	−15.24***

Mean adjusted $R^2 = 0.407$

** Statistically significant at the 0.01 level (two-tailed test).

*** Statistically significant at the 0.001 level (one-tailed test).

[a] Variables are defined in Panel B of Table 1.

[b] t-statistics are calculated as the mean coefficient ÷ the standard error of the coefficient across the years 1985–1995 and 1981–1995 for the debt-rating and debt/equity samples, respectively.

in Lang et al. (1996), who find a negative association between leverage and future capital expenditures, capital expenditure growth, and employment growth. This study considers an alternative growth measure by investigating the relationship between debt/equity ratios and expected earnings growth in the following model.

$$\begin{aligned} \text{LDME} = \beta_0 &+ \beta_1 \text{ ANLTG} + \beta_2 \text{ XROE} + \beta_3 \text{ LTA} \\ &+ \beta_4 \text{ FXTA} + \beta_5 \text{ NDTS} + \beta_6 \text{ RDADX} + e \end{aligned} \tag{3}$$

where:

FXTA = the sum of inventory plus gross plant and equipment divided by total assets at the end of year t − 1;
NDTS = the nondebt tax shield, calculated as the sum of depreciation and amortization expense and investment tax credits divided by the sum of operating income before depreciation, interest, and taxes and nonoperating income /expense for year t − 1;
RDADX = the sum of research and development and advertisement expense divided by net sales revenue for year t − 1; and

all other variables are as defined earlier. Control variables in equation (3) are selected based on prior research examining determinants of debt/equity ratios (Bradley et al. 1984; Long and Malitz 1985; Kester 1986; Kim and Sorensen 1986; Friend and Hasbrouck 1988; Titman and Wessels 1988; Lang et al. 1996). In general, those studies find positive coefficients for LTA, FXTA, and NDTS, and a negative coefficient for RDADX. LTA is included since larger firms tend to enjoy easier access to capital markets and lower interest costs. FXTA and NDTS reflect the capacity of the firm to collateralize their debt which should positively influence debt/equity ratios. RDADX is included to control for product uniqueness, which will negatively affect debt/equity ratios by its influence on a firm's optimal liquidation policy (Titman and Wessels 1988). Consistent with a predicted negative relationship between leverage and expected earnings growth, negative coefficients are expected for ANLTG and XROE.

The results, summarized in Table 2 Panel B, show that debt/equity ratios are negatively associated with both expected earnings growth measures. As with bond ratings, this result provides the foundation for suggesting that debt/equity ratios may reflect expected earnings growth in an ERC context.[17] Note also that the coefficients for LTA and NDTS are significantly positive while the coefficient for RDADX is significantly negative as predicted.[18] However, the coefficient for FXTA is negative. A positive coefficient was expected based on the results of recent studies that include FXTA as a proxy for collateral value. Further analysis suggests that the result for FXTA reported in Panel B may be the result of the other variables also controlling for collateral value. When only FXTA is included in equation (3), the coefficient (t-statistic) of 0.541 (5.25) is positive as predicted. Further, the negative coefficient reported in Panel B is consistent with Ferri and Jones (1979), who report a negative relation between FXTA and debt ratios and suggest that FXTA also reflects the effect of operating leverage on debt levels.

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[17] The simple (Spearman) correlations between RATE and ANLTG (−0.066) and XROE (−0.342) and between LDME and ANLTG (−0.491) and XROE (−0.438), all significant at least at the 0.0001 level, further support the finding that lower debt ratings and greater debt/equity ratios are associated with lower expected future earnings growth.

[18] The data requirements for RDADX substantially reduced the sample size to 4,475 firm-year observations. Equation (3) was also estimated without RDADX to assess results for ANLTG and XROE for the debt/equity sample used to estimate equation (1) (in Table 1). Results for all included variables were qualitatively similar to those reported in Table 2, Panel B.

ERC Results

Table 3 summarizes the earnings changes–abnormal returns regression results for the bond-rating and debt/equity ratio samples. In Panel A, Column 1 results generally confirm the results in DR regarding the bond-rating sample. Of particular importance, the coefficient (t-statistic) for RATE of 0.018 (2.93) in this reverse-regression context is consistent with higher bond ratings being associated with larger ERCs. Results in Column 2 indicate that inclusion of ANLTG has only a small effect on the coefficient for RATE, while the coefficient on ANLTG (−0.494) is of the predicted sign and significant (t-statistic of −3.90). However, results in Column 3 indicate that when XROE is included, the coefficient for RATE is −0.002 and is no longer significant (t-statistic = −0.27), while the coefficient for XROE (−0.482) is of the predicted sign and significant (t-statistic of −5.75).[19] Similar results for RATE are observed when both ANLTG and XROE are included, however, only the coefficient on XROE remains significantly associated with ERCs. Thus there is no relation between bond ratings and ERCs when proxies for earnings growth are included in the model. I interpret these results to mean that bond ratings reflect expected earnings growth rather than equity risk in an ERC context.

For the debt/equity sample, summary results in Panel B Column 1 indicate that all coefficients are as predicted and significant, except that the coefficient for BETA is not significant.[20] Of particular importance, the positive coefficient for LDME indicates that debt/equity ratios are negatively associated with ERCs. Interestingly, results in Column 2 indicate that the coefficient for ANLTG is not significant, and its inclusion has no effect on LDME. However, results in Columns 3 and 4 show that inclusion of XROE in the model has an attenuating influence on the coefficient for LDME, while the coefficient for XROE is of the predicted sign and significant. When XROE and ANLTG are included in the model, the coefficient for LDME is reduced from 0.027 (Column 1) to 0.014 (Column 4) but remains significant (t-statistic of 3.08). These results suggest not only that debt/equity ratios partially reflect expected earnings growth in an ERC context, but that they also may partially reflect default risk as suggested in DR (1994). However, the interpretation of the role that debt/equity ratios are playing in Model 4 is complicated by the fact that BETA does not have a significant coefficient in this analysis.[21,22]

Insignificance for BETA in Panel B suggests there may be some underlying difference related to equity risk between the debt-rating and debt/equity samples that limits conclusions and comparability of results. To address this concern, equation (1) was also estimated (untabulated) in the debt-rating sample after including LDME instead of RATE. For Model

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[19] Skinner (1993) finds a negative relationship between asset beta and an assets-in-place variable suggesting that firms with relatively more growth opportunities (fewer assets-in-place) have more risk. However, the positive association between ERCs and both ANLTG and XROE would not suggest that they are capturing risk in an ERC context.

[20] Using quarterly data, Freeman and Tse (1992) and Easton and Zmijewski (1989) do not find equity beta to be significantly related to ERCs for their respective samples.

[21] Teets and Wasley (1996) find the cross-sectional ERC biased relative to a firm-specific ERC. Firm-specific regressions of reverse response coefficients on average values of the independent variables produced results that are qualitatively similar to those in Table 3.

[22] Though the analyses make use of time-series t-statistics from yearly cross-sectional regressions, some cross-sectional dependence may exist from including calendar and noncalendar year-end firms. Results and conclusions are qualitatively unchanged after restricting the sample to December year-end firms.

TABLE 3
Summary Statistics from Separate Yearly Earnings Changes Abnormal Returns Regressions

Panel A: Bond Rating Results

$$\text{Model: } CHGEPS = \alpha_0 + \alpha_1\, CAR + \alpha_2\, (CAR{*}BETA) + \alpha_3\, (CAR{*}PERS) + \alpha_4\, (CAR{*}RATE) + \alpha_5\, (CAR{*}ANLTG) + \alpha_6\, (CAR{*}XROE) + e$$

Variable	*Predicted Sign*	*Mean Coefficient (t-statistic)* 1	2	3	4
Intercept (α_0)	(?)	0.007 (2.34)*	0.007 (2.29)*	0.005 (1.65)	0.005 (1.67)
CAR (α_1)	+	0.055 (3.46)**	0.094 (5.07)***	0.071 (4.55)***	0.092 (5.11)***
BETA (α_2)	+	0.026 (2.61)*	0.037 (3.65)**	0.031 (3.40)**	0.035 (3.64)**
PERS (α_3)	−	−0.025 (−1.97)*	−0.016 (−1.23)	−0.012 (−1.22)	−0.009 (−0.84)
RATE (α_4)	+	0.018 (2.93)**	0.016 (2.75)**	−0.002 (−0.27)	−0.002 (−0.29)
ANLTG (α_5)	−		−0.494 (−3.90)**		−0.254 (−1.76)
XROE (α_6)	−			−0.482 (−5.75)***	−0.467 (−5.10)***
Mean adjusted R^2		0.078	0.082	0.123	0.125

Panel B: Debt/Equity Results

$$\text{Model: } CHGEPS = \alpha_0 + \alpha_1\, CAR + \alpha_2\, (CAR{*}BETA) + \alpha_3\, (CAR{*}PERS) + \alpha_4\, (CAR{*}LDME) + \alpha_5\, (CAR{*}ANLTG) + \alpha_6\, (CAR{*}XROE) + e$$

Variable	*Predicted Sign*	*Mean Coefficient (t-statistic)* 1	2	3	4
Intercept (α_0)	(?)	0.002 (0.74)	0.002 (0.74)	0.001 (0.41)	0.001 (0.41)
CAR (α_1)	+	0.079 (6.99)***	0.087 (5.72)***	0.085 (7.87)***	0.097 (6.72)***
BETA (α_2)	+	0.012 (1.13)	0.011 (0.95)	0.007 (0.61)	0.007 (0.58)
PERS (α_3)	−	−0.018 (−2.34)*	−0.017 (−2.14)*	−0.011 (−1.64)	−0.009 (−1.41)
LDME (α_4)	+	0.027 (6.19)***	0.027 (5.97)***	0.015 (3.41)**	0.014 (3.08)**

(*Continued on next page*)

TABLE 3 (Continued)

Variable[a]	*Predicted Sign*	*Mean Coefficient (t-statistic)*[b] *1*	*2*	*3*	*4*
ANLTG (α_5)	–		−0.066 (−0.69)		−0.113 (−1.22)
XROE (α_6)	–			−0.300 (−4.87)***	−0.298 (−4.75)***
Mean adjusted R^2		0.095	0.098	0.113	0.115

* Statistically significant at the 0.05 level (one-tailed test).

** Statistically significant at the 0.01 level (one-tailed test).

*** Statistically significant at the 0.001 level (one-tailed test).

[a] Variables are defined in Panel B of Table 1.

[b] t-statistics are calculated as the mean coefficient ÷ the standard error of the coefficient across the years 1986–1996 and 1982–1996 for the debt-rating and debt/equity samples, respectively.

1, the coefficient for LDME of 0.022 is comparable to 0.027 as reported in Table 3, Panel B and is significant (t-statistic of 2.81). However, a pattern similar to that for RATE is observed across Models 2 through 4. In Model 4, the coefficient (t-statistic) for LDME is reduced to 0.007 (0.87). Results for the other variables are qualitatively similar to those reported in Panel A. These results strengthen the suggestion that debt/equity ratios also reflect expected earnings growth in an ERC context, at least in the sample for which firms have bond ratings.

IV. CONCLUSION

Results in this study indicate that the association between bond ratings and ERCs observed in DR is largely due to bond ratings reflecting expected earnings growth rather than some element of equity risk not captured by systematic risk (BETA). Results also indicate that the association between debt-to-market equity ratios and ERCs partially reflects the association between debt/equity ratios and expected earnings growth. These results clarify the findings in DR and add to existing research related to the determinants of ERCs.

This study attempted to unravel whether alternative measures of default risk are related to ERCs in the presence of equity beta and expected earnings growth. The results are mixed. At a minimum, the results here suggest that the incremental role of default risk in explaining ERCs needs to be assessed in the presence of earnings growth. The results here raise the prospect that default risk has no general role in explaining ERCs that is not captured by equity beta and expected earnings growth. However, the nature of the difference in the findings for the debt-rating and debt/equity samples suggests that default risk may play a relevant incremental role for some firms. For example, Burgstahler et al. (1989) find that changes in bankruptcy risk have a detectable impact on firm value only for firms for which bankruptcy has a nontrivial probability of occurrence. The results here suggest that default risk may have a rather limited role in explaining ERCs.

REFERENCES

Abarbanell, J. S., and B. J. Bushee. 1997. Fundamental analysis, future earnings, and stock prices. *Journal of Accounting Research* 35: 1–24.

Beaver, W., R. Lambert, and S. Ryan. 1987. The information content of security prices: A second look. *Journal of Accounting and Economics* 9: 139–158.

Bradley, M., G. Jarrell, and E. H. Kim. 1984. On the existence of an optimal capital structure: Theory and evidence. *Journal of Finance* 39: 857–878.

Brown, L. D., P. A. Griffin, R. L. Hagerman, and M. E. Zmijewski. 1987. Security analyst superiority relative to univariate time-series models in forecasting quarterly earnings. *Journal of Accounting and Economics* 9: 61–87.

Burgstahler, D., J. Jiambalvo, and E. Noreen. 1989. Changes in the probability of bankruptcy and equity value. *Journal of Accounting and Economics* 11: 207–224.

Collins, D. W., and S. P. Kothari. 1989. An analysis of intertemporal and cross-sectional determinants of earnings response coefficients. *Journal of Accounting and Economics* 11: 143–181.

Dhaliwal, D., and S. Reynolds. 1994. The effect of the default risk of debt on the earnings response coefficient. *The Accounting Review* 69: 412–419.

Easton, P. D., and M. E. Zmijewski. 1989. Cross-sectional variation in the stock market response to accounting earnings announcements. *Journal of Accounting and Economics* 11: 117–141.

Edwards, E. O., and P. W. Bell. 1961. *The Theory and Measurement of Business Income.* Berkeley, CA: University of California Press.

Feltham, G. A., and J. A. Ohlson. 1999. Residual earnings valuation with risk and stochastic interest rates. *The Accounting Review* 74: 165–183.

Ferri, M. G., and W. H. Jones. 1979. Determinants of financial structure: A new methodological approach. *Journal of Finance* 34: 631–644.

Freeman, R. N., and S. Y. Tse. 1992. A nonlinear model of security price responses to unexpected earnings. *Journal of Accounting Research* 30: 185–209.

Friend, I., and J. Hasbrouck. 1988. Determinants of capital structure. In *Research in Finance,* Volume 7, edited by Andy Chen, 1–19. New York, NY: JAI Press, Inc.

Harris, M., and A. Raviv. 1991. The theory of capital structure. *The Journal of Finance* 46: 297–355.

Jensen, M. C., and W. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs, and capital structure. *Journal of Financial Economics* 3: 305–360.

Kaplan, R. S., and G. Urwitz. 1979. Statistical models of bond ratings: A methodological inquiry. *Journal of Business* 52: 231–261.

Kester, C. W. 1986. Capital and ownership structure: A comparison of United States and Japanese manufacturing corporations. *Financial Management*: 5–16.

Kim, W. S., and E. H. Sorensen. 1986. Evidence on the impact of the agency costs of debt in corporate debt policy. *Journal of Financial and Quantitative Analysis* 21: 131–144.

Lang, L., E. Ofek, and R. M. Stulz. 1996. Leverage, investment, and firm growth. *Journal of Financial Economics* 40: 3–29.

LaPorta, R. 1996. Expectations and the cross-section of stock returns. *The Journal of Finance* 51: 1715–1742.

Leftwich, R., and M. E. Zmijewski. 1994. Contemporaneous announcements of dividends and earnings. *Journal of Accounting, Auditing and Finance* (Winter): 725–762.

Long, M., and I. Malitz. 1985. The investment-financing nexus: Some empirical evidence. *Midland Corporate Financial Journal* 3: 53–59.

Maher, J. J. 1987. Pension obligations and the bond credit market: An empirical analysis of accounting numbers. *The Accounting Review* 62: 785–798.

Myers, S. C. 1977. Determinants of corporate borrowing. *Journal of Financial Economics* 5: 147–175.

Ohlson, J. 1995. Earnings, book values, and dividends in security valuation. *Contemporary Accounting Research* 11: 661–687.

Peasnell, K. 1982. Some formal connections between economic values and yields and accounting numbers. *Journal of Business Finance and Accounting* 9: 361–381.

Preinreich, G. 1938. Annual survey of economic theory: The theory of depreciation. *Econometrica* 6: 219–241.

Skinner, D. J. 1993. The investment opportunity set and accounting procedure choice: Preliminary evidence. *Journal of Accounting and Economics* 16: 407–446.

Standard & Poor's. 1986. *Debt Ratings Criteria*. New York, NY: Standard & Poor's.

Teets, W. R., and C. E. Wasley. 1996. Estimating earnings response coefficients: Pooled vs. firm-specific models. *Journal of Accounting and Economics* 21: 279–295.

Titman, S., and R. Wessels. 1988. The determinants of capital structure choice. *Journal of Finance* 43: 1–19.

White, G. I., A. C. Sondhi, and D. Fried. 1998. *The Analysis and Use of Financial Statements*. New York, NY: John Wiley & Sons, Inc.

Ziebart, D. A., and S. A. Reiter. 1992. Bond ratings, bond yields, and financial information. *Contemporary Accounting Research* 9: 252–289.

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BOOK REVIEWS

Thomas H. Williams, Editor

Editor's Note: Two copies of books for review should be sent to the incoming Book Review Editor, Professor Jane L. Reimers, College of Business, Florida State University, Tallahassee, FL 32306-1042. The policy of *The Accounting Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.

ROBERT S. KAPLAN, DAVID P. NORTON, and PHILIP J. FERNEAU, *Balancing the Corporate Scorecard* (Cambridge, MA: Harvard Business School Publishing, 1998, Interactive Simulation, $295 to the general public, $16 for academic use).

This is an interactive simulation, packaged on a CD-ROM, that combines the teaching of the Balanced Scorecard concept with a business simulation game, to be played without, and then with, a formally developed Balanced Scorecard. The simulation consists of three major parts:

(1) Getting ready to learn (1 hour estimated time), which provides the student with an introduction to Sentra Software, the company that they will be running;
(2) Hands-on Learning of the Balanced Scorecard Method (3 hours estimated time), in which the Balanced Scorecard methodology is presented, the students are given the opportunity to develop their own Balanced Scorecard, and then to replay the simulation; and
(3) Helping the Lessons Stick (1 hour estimated time), in which the student is invited to try a Scorecard that is suggested by the software, to experiment with developing a new Scorecard for new market conditions, and in which the critical Scorecard lessons are emphasized.

The simulation is appropriate for two different audiences: the traditional M.B.A. audience, and the corporate training/executive education audience. The specific approach can be tailored to best meet the educational objectives of either group.

I have used this simulation over the past year with approximately 350 Thunderbird Master of International Management students at the end of the (first year) Profit Planning and Control course. I provided a brief overview of the Balanced Scorecard during a regular class session, and did suggest that the students familiarize themselves with it by reading one or more of the Kaplan and Norton *Harvard Business Review* articles on the subject.

Each time that I have used it, the simulation was played over a weekend, by study groups of three to five students. In general, it has been very well received. There are some aspects of the simulation that the students like very much. Particularly, they judge the production values to be very good. The simulation is very easy to run, the graphics, video clips, emails and art used to communicate information are clear, and support the called-for decisions quite well. The students enjoy the transparency of the relationship between decisions and outcomes. They find the integration of financial information with market, customer and product development information to be refreshing (at this point in their Master's program), but are frustrated by the lack of perfect information.

Other aspects of the simulation are less popular. Despite prior warnings in class, many students are frustrated by the impossibility of "winning" the game. As the excellent Facilitator's Guide mentions, it is impossible to go more than 20 rounds. Most students will not come close to that. As the market for Sentra Software's product changes, the students find themselves unable to fully adjust to it. Students also would like to have more market and industry information, and more qualitative feedback about internal processes, such as the precise role of consultants. They are frustrated that they were unable to establish pricing strategies, target market segments and product proliferation strategies. However, the most negative reactions relate to the length of the game. Although the designers claim that the simulation can be played in five or six hours, most students claim that it requires eight to ten hours. In particular, the students believe that they could learn as much by shortening the first part considerably.

Suggestions for improving the game focus on shortening the simulation, enhancing its strategic content, or making it more comprehensive and "winnable." Some claim that the simulation would be more effective if they had a better understanding of the company mission and strategies, long-term goals, and were able to incorporate market research during the game.

Few technical difficulties were found. The computer system requirements are modest, and most students are able to install the simulation on their laptops. Many students report trouble saving their progress, forcing them to play the entire game at once. On some machines, the volume was so low that the video clips could not be heard. A volume control would solve that problem. Several students suggest a rewinding option, so that entire video clips would not have to be replayed, and adding drop-down menus, to look up definitions and available options.

Notwithstanding the above shortcomings, the students were very happy with the experience. The simulation gives them the opportunity to try out what they have learned in a realistic context. The result is a rich learning experience, one that is not easily matched using paper cases.

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GARY JOHN PREVITS AND BARBARA DUBIS MERINO, *A History of Accountancy in the United States: The Cultural Significance of Accounts* (Columbus, OH: Ohio State University Press, 1998, pp. xx, 577, $55 Hb, $24.95 Pb).

Who should read Previts and Merino's history of accountancy in the United States? The question is akin to asking the question, "Who should read history?" In the postmodern era of sound bites and instantaneous change, some would argue that history is superfluous, if not dead. You need know little about the history of accountancy to operate a successful accountancy practice, publish research, pass the CPA exam, or earn a doctorate in accounting. It would appear that history doesn't matter, or does it? Would an understanding of the difficult struggle accountants waged to gain professional status in the early 1900s, even going to the extent of lobbying in favor of legal liability in order to enhance their reputation, give practitioners a better perspective on contemporary trends in the accounting industry? Would an appreciation of the formative debates between entity theorists and proprietary theorists give academic researchers and educators a better perspective for understanding the assumptions underlying contemporary accounting thought? Can history inform current controversies over professional independence, legal liability, the merits of technical vs. general accounting education, the purpose and uses of financial statements, the tension between the professionals' responsibilities to clients and the public interest, intraprofessional rivalries, and the contribution of academic research to practice, all of which, as Previts and Merino show, have deep historical roots?

Previts and Merino's history, which is a revised and expanded release of the work originally published in 1979, is of sufficient breadth and scope to provide a context for understanding these and other contemporary accounting issues. The book is ambitious in scope. It chronicles the history of accountancy in the United States from colonial times, through the gilded age, the progressive era, the Depression, New Deal, and post war years, concluding with a new chapter on accountancy and the global capital market (1973–1995). Its content is equally expansive. It describes the growth of the accounting profession and professional institutions, the development of accounting education, and the evolution of accounting theory. Although emphasis is given to financial accounting and audit, the history also chronicles significant developments in cost, tax, government, and nonprofit accounting. *A History of Accountancy in the United States* is as well researched and referenced as it is comprehensive, making it a significant scholarly achievement. It remains unchallenged as the authoritative comprehensive reference on the history of accountancy in the United States.

While this book would be significant as a descriptive history alone, Previts and Merino's work is more than a chronology of facts. They provide an excellent analysis of how various cultural and political trends influenced the growth of accountancy in the United States. Their discussion of the assumptions underlying proprietary and entity theory is essential reading for anyone interested in understanding the foundations of accounting thought. Their analysis of how accountancy was influence by the ebb and flow of the dominant property rights paradigm as it was periodically challenged by progressive reformers in the early 1900s, New Dealers in the 1930s, and establishment critics in the 1970s, and reasserted in the 1920s, 1950s, and 1980s is equally thought-provoking.

Previts and Merino demonstrate how accounting institutions, accounting thought and accounting education have been shaped by changing cultural currents and political shifts as well as market forces, and as such reminds us that the current state of accountancy practice and theory is an equally tenuous product of its time.

When Previts and Merino published the original edition of *The History of Accountancy in the United States* in 1979, this journal wrote that "its major strength is the challenge it presents to the current state of the various institutions bearing on accounting and to the entire theoretical framework on which accounting practice and accounting education rest." That significant challenge remains relevant today, and perhaps explains why we should read history, and why practitioners and academics alike should read this book.

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BOOKS RECEIVED APRIL 15, 1999 TO AUGUST 15, 1999

NIAMH BRENNAN, *Disclosure of Profit Forecasts During Takeovers: Evidence from Directors and Advisors* (Edinburgh, Scotland: The Institute of Chartered Accountants of Scotland, 1998, x, 106, Pb £15.00).

ROBERT JAMES CIMASI, *A Guide to Consulting Services for Emerging Healthcare Organizations* (New York, NY: John Wiley & Sons, Inc., 1999, xxi, 501, Hb $75).

PAUL A. COPLEY and GEORGE D. SANDERS, eds., *Research in Governmental and Nonprofit Accounting, Volume 10* (Stamford, CT: JAI Press Inc., 1999, x, 234, Hb $78.50).

MARC J. EPSTEIN, JOHN Y. LEE, and KAY M. POSTON, eds., *Advances in Management Accounting, Volume 7* (Stamford, CT: JAI Press Inc., 1999, xvii, 251, Hb $78.50).

JAMES E. HUNTON, ed., Advances in Accounting Behavioral *Research, Volume 2* (Stamford, CT: JAI Press Inc., 1999, xiii, 307, Hb $78.50).

CHENG-FEW LEE, *Advances in Quantitative Analysis of Finance and Accounting, Vol. 7* (Stamford, CT: JAI Press, Inc., 1999, vii, 211, Hb $78.50).

DAVID L. MCKEE, DON E. GARNER, and YOSRA ABUAMARA MCKEE, *Accounting Services, the Islamic Middle East, and the Global Economy* (Westport, CT: Quorum Books, 1999, vi, 185, Hb $65).

STEVE PLAYER and DAVID E. KEYS, eds., *Activity-Based Management: Arthur Andersen's Lessons from the ABM Battlefield, Second Edition* (New York: John Wiley & Sons, Inc., 1999, xv, 268, Hb $29.95).

LAWRENCE A. PONEMON, MARC J. EPSTEIN, and JAMES GAA, eds., *Research on Accounting Ethics, Volume 5* (Stamford, CT: JAI Press Inc., 1999, xv, 342, Hb $78.50).

AHMED RIAHI-BELKAOUI, *Corporate Social Awareness and Financial Outcomes* (Westport: CT: Quorum Books, 1999, xiv, 194, Hb $65).

AHMED RIAHI-BELKAOUI, *Performance Results of Multinationality* (Westport: CT: Quorum Books, 1999, xv, 182, Hb $65).

REED TINSLEY, RHONDA SIDES, and GREGORY D. ANDERSON, *Valuation of a Medical Practice* (New York, NY: John Wiley & Sons, Inc., 1999, ix, 278, Hb $89).

Editorial Data

Manuscripts submitted to *The Accounting Review* are assigned two reviewers. The following table contains information about turnaround time for reviewed manuscripts for the 12-month period ended May 31, 1999. Turnaround time is the number of days between the date of the editor's letter to the author(s) and the date that the manuscript and submission fee were received:

	Number of Manuscripts	Cumulative Number	Cumulative Percent
0 ≤ Days ≤ 30	12	12	5.2
31 ≤ Days ≤ 60	26	38	16.4
61 ≤ Days ≤ 90	136	174	75
91 ≤ Days ≤ 120	58	232	100

The mean review time was 75 days; the median review time was 79 days. A limited number of manuscripts are returned without review and such manuscripts are excluded from the turnaround time statistics reported above.

EDITORIAL POLICY AND STYLE INFORMATION

EDITORIAL POLICY

According to the policies set by the Publications Committee (which were endorsed by the Executive Committee and were published in the *Accounting Education News*, June 1987), *The Accounting Review* "should be viewed as the premier journal for publishing articles reporting the results of accounting research and explaining and illustrating related research methodology. The scope of acceptable articles should embrace any research methodology and any accounting-related subject, as long as the articles meet the standards established for publication in the journal....No special sections should be necessary. The primary, but not exclusive, audience should be—as it is now—academicians, graduate students, and others interested in accounting research."

The primary criterion for publication in *The Accounting Review* is the significance of the contribution an article makes to the literature.

The efficiency and effectiveness of the editorial review process is critically dependent upon the actions of both authors submitting papers and the reviewers. Authors accept the responsibility of preparing research papers at a level suitable for evaluation by independent reviewers. Such preparation, therefore, should include subjecting the manuscript to critique by colleagues and others and revising it accordingly prior to submission. The review process is not to be used as a means of obtaining feedback at early stages of developing the research.

Reviewers and associate editors are responsible for providing critically constructive and prompt evaluations of submitted research papers based on the significance of their contribution and on the rigor of analysis and presentation. Associate editors also make editorial recommendations to the editor.

MANUSCRIPT PREPARATION AND STYLE

The Accounting Review's manuscript preparation guidelines follow (with a sight modification) the B-format of *The Chicago Manual of Style* (14th ed.; University of Chicago Press). Another helpful guide to usage and style is *The Elements of Style*, by William Strunk, Jr., and E. B. White (Macmillan). Spelling follows *Webster's International Dictionary.*

FORMAT

1. All manuscripts should be typed on one side of 8½ × 11" good quality paper and be double spaced, except for indented quotations.
2. Manuscripts should be as concise as the subject and research method permit, generally not to exceed 7,000 words.
3. Margins of at least one inch from top, bottom and sides should facilitate editing and duplication.
4. To assure anonymous review, authors should not identify themselves directly or indirectly in their papers. Single authors should not use the editorial "we."
5. A cover page should show the title of the paper, the author's name, title and affiliation, any acknowledgments, and a footnote indicating whether the author would be willing to share the data (see last paragraph in this statement).

Pagination: All pages, including tables, appendices and references, should be serially numbered. The first section of the paper should be untitled and unnumbered. Major sections may be numbered in Roman numerals. Subsections should not be numbered.

Numbers: Spell out numbers from one to ten, except when used in tables and lists, and when used with mathematical, statistical, scientific, or technical units and quantities, such as distances, weights and measures. For example: *three days; 3 kilometers; 30 years*. All other numbers are expressed numerically.

Percentages and Decimal Fractions: In nontechnical copy use the word percent in the text.

Hyphens: Use a hyphen to join unit modifiers or to clarify usage. For example: *a well-presented analysis; re-form*. See *Webster's* for correct usage.

Key Words: The abstract is to be followed by four key words that will assist in indexing the paper.

ABSTRACT/INTRODUCTION

An Abstract of about 100 words should be presented on a separate page immediately preceding the text. The Abstract should concisely inform the reader of the manuscript's topic, its methods and its findings. Key Words and the Data Availability statements should follow the Abstract. The text of the paper should start with a section labeled "I. Introduction," which provides more details about the paper's purpose, motivation, methodology and findings. Both the Abstract and the introduction should be relatively nontechnical, yet clear enough for an informed reader to understand the manuscript's contribution. The manuscript's title, but neither the author's name nor other identification designations, should appear on the Abstract page.

TABLES AND FIGURES

The author should note the following general requirements:

1. Each table and figure (graphic) should appear on a separate page and should be placed at the end of the text. Each should bear an Arabic number and a complete title indicating the exact contents of the table or figure.
2. A reference to each graphic should be made in the text.
3. The author should indicate by marginal notation where each graphic should be inserted in the text.
4. Graphics should be reasonably interpreted without reference to the text.
5. Source lines and notes should be included as necessary.

Equations: Equations should be numbered in parentheses flush with the right-hand margin.

DOCUMENTATION

Citations: Work cited should use the "author-date system" keyed to a list of works in the reference list (see below). Authors should make an effort to include the relevant page numbers in the cited works.

1. In the text, works are cited as follows: authors' last name and date, without comma, in parentheses: for example, (Jones 1987); with two authors: (Jones and Freeman 1973); with more than two: (Jones et al. 1985); with more than one source cited together (Jones 1987; Freeman 1986); with two or more works by one author: (Jones 1985, 1987).
2. Unless confusion would result, do not use "p." or "pp." before page numbers: for example, (Jones 1987, 115).
3. When the reference list contains more than one work of an author published in the same year, the suffix a, b, etc. follows the date in the text citation: for example, (Jones 1987a) or (Jones 1987a; Freeman 1985b).
4. If an author's name is mentioned in the text, it need not be repeated in the citation; for example, "Jones (1987, 115) says...."
5. Citations to institutional works should use acronyms or short titles where practicable; for example, (AAA ASOBAT 1966); (AICPA Cohen Commission Report 1977). Where brief, the full title of an institutional work might be shown in a citation: for example, (ICAEW *The Corporate Report* 1975).
6. If the manuscript refers to statutes, legal treatises or court cases, citations acceptable in law reviews should be used.

Reference List: Every manuscript must include a list of references containing only those works cited. Each entry should contain all data necessary for unambiguous identification. With the author-date system, use the following format recommended by *The Chicago Manual*:

1. Arrange citations in alphabetical order according to surname of the first author or the name of the institution responsible for the citation.
2. Use author's initials instead of proper names.
3. Date of publication should be placed immediately after author's name.
4. Titles of journals should not be abbreviated.
5. Multiple works by the same author(s) in the same year are distinguished by letters after the date.
6. Inclusive page numbers are treated as recommended in *Chicago Manual* section 8.67.

Sample entries are as follows:

American Accounting Association, Committee on Concepts and Standards for External Financial Reports. 1977. *Statement on Accounting Theory and Theory Acceptance*. Sarasota, FL: AAA.

Demski, J. S., and D. E. M. Sappington. 1989. Hierarchical structure and responsibility accounting. *Journal of Accounting Research* 27 (Spring): 40–58.

Dye, R., B. Balachandran, and R. Magee. 1989. Contingent fees for audit firms. Working paper, Northwestern University, Evanston, IL.

Fabozzi, F., and I. Pollack, eds. 1987. *The Handbook of Fixed Income Securities*. 2nd edition. Homewood, IL: Dow Jones-Irwin.

Kahneman, D., P. Slovic, and A. Tversky, eds. 1982. *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge, U.K.: Cambridge University Press.

Porcano, T. M. 1984a. Distributive justice and tax policy. *The Accounting Review* 59 (October): 619–636.

———. 1984b. The perceived effects of tax policy on corporate investment intentions. *The Journal of the American Taxation Association* 6 (Fall): 7–19.

Shaw, W. H. 1985. Empirical evidence on the market impact of the safe harbor leasing law. Ph.D. dissertation, University of Texas at Austin.

Sherman, T. M., ed. 1984. *Conceptual Framework for Financial Accounting*. Cambridge, MA: Harvard Business School.

Footnotes: Footnotes are not used for documentation. Textual footnotes should be used only for extensions and useful excursions of information that if included in the body of the text might disrupt its continuity. Footnotes should be consecutively numbered throughout the manuscript with superscript Arabic numerals. Footnote text should be doubled-spaced and placed at the end of the article.

SUBMISSION OF MANUSCRIPTS

Authors should note the following guidelines for submitting manuscripts:

1. Manuscripts currently under consideration by another journal or publisher should not be submitted. The author must state that the work is not submitted or published elsewhere.
2. In the case of manuscripts reporting on field surveys or experiments, four copies of the instrument (questionnaire, case, interview plan or the like) should be submitted.
3. Four copies should be submitted together with a check in U.S. funds for $75.00 for members or $100.00 for nonmembers of the AAA made payable to the American Accounting Association. Effective January 1990, the submission fee is nonrefundable.
4. The author should retain a copy of the paper.
5. Revisions must be submitted within 12 months from request, otherwise they will be considered new submissions.

COMMENTS

Comments on articles previously published in *The Accounting Review* will be reviewed (anonymously) by two reviewers in sequence. The first reviewer will be the author of the original article being subjected to critique. If substance permits, a suitably revised comment will be sent to a second reviewer to determine its publishability in *The Accounting Review*. If a comment is accepted for publication, the original author will be invited to reply. All other editorial requirements, as enumerated above, also apply to proposed comments.

POLICY ON REPRODUCTION

An objective of *The Accounting Review* is to promote the wide dissemination of the results of systematic scholarly inquiries into the broad field of accounting.

Permission is hereby granted to reproduce any of the contents of the *Review* for use in courses of instruction, as long as the source and American Accounting Association copyright are indicated in any such reproductions.

Written application must be made to the Editor for permission to reproduce any of the contents of the *Review* for use in other than courses of instruction—e.g., inclusion in books of readings or in any other publications intended for general distribution. In consideration for the grant of permission by the *Review* in such instances, the applicant must notify the author(s) in writing of the intended use to be made of each reproduction. Normally, the *Review* will not assess a charge for the waiver of copyright.

Except where otherwise noted in articles, the copyright interest has been transferred to the American Accounting Association. Where the author(s) has (have) not transferred the copyright to the Association, applicants must seek permission to reproduce (for all purposes) directly from the author(s).

POLICY ON DATA AVAILABILITY

The following policy has been adopted by the Executive Committee in its April 1989 meeting.

"An objective of (*The Accounting Review, Accounting Horizons, Issues in Accounting Education*) is to provide the widest possible dissemination of knowledge based on systematic scholarly inquiries into accounting as a field of professional research, and educational activity. As part of this process, authors are encouraged to make their data available for use by others in extending or replicating results reported in their articles. Authors of articles which report data dependent results should footnote the status of data availability and, when pertinent, this should be accompanied by information on how the data may be obtained."

OCTOBER 1999 PLACEMENT ADS

The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication. The ***Review*** *is published on the first day of January, April, July and October. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 34233-2399, ATTENTION: ADVERTISING DEPT. All replies to box numbers should be on separate sheets to facilitate forwarding.*

401 FLORIDA ATLANTIC UNIVERSITY School of Accounting invites applications for faculty positions in Accounting and Auditing at its three campuses for Fall 2000. Rank of Assistant Professor is preferred. Candidates must have an earned doctorate in Accounting or be ABD. Relevant professional certification and prior teaching experience are desired. Position availabilities are subject to funding. Application deadline is November 12, 1999. Candidates should send letter of interest, *curriculum vitae*, and names of three references to Dr. Kathryn Means, Chair, Faculty Recruiting, School of Accounting, Florida Atlantic University, PO Box 2091, Boca Raton, FL 33431. Phone: (561) 297-2667; email: meansk@fau.edu.

402 BINGHAMTON UNIVERSITY'S AACSB-accredited School of Management invites applications for anticipated positions in Accounting at the Assistant and Senior level (Full/Associate) for Fall 2000 to serve in Bachelor's, Masters, E.M.B.A., and Ph.D. Programs. Primary areas are in Behavioral, Financial, Managerial or AIS. Either appointment requires an established record of excellent research and quality teaching with a two-course/semester teaching assignment. The Senior appointment will require interaction with the practice community and service in our Ph.D. Program. Binghamton has well-established CPA connections (i.e., 70/140 accounting seniors had Big 5 offers prior to September) and a substantial regional high-tech (IBM, Lockheed Martin, Universal Instruments, Hughes Aircraft) community. Interested candidates should send a *curriculum vitae* to Professor Martin Freedman, School of Management, Binghamton University, Binghamton, NY 13902-6015; fax: (607) 777-4422; email: mfreed@binghamton.edu. State University of New York is an Equal Opportunity/Affirmative Action Employer.

403 UNIVERSITY OF NORTH CAROLINA AT WILMINGTON invites applications for one or more anticipated tenure-track positions at the Assistant or Associate level beginning Fall 2000. All areas of interest are encouraged to apply with special consideration being given to candidates with a primary interest in AIS, Auditing or Tax. A Ph.D. in Accounting is required, and candidates must be committed to excellence in teaching and research. Resumes received prior to November 15, 1999 will receive priority consideration. Women and minorities are encouraged to apply. Send letter and resume to Dr. Joanne Rockness, Search Committee Chair, Department of Accountancy and Business Law, Cameron School of Business, University of North Carolina at Wilmington, 601 S. College Road, Wilmington, NC, 28403-3297. UNCW is an Affirmative Action, Equal Opportunity Employer.

404 UNIVERSITY OF MISSOURI-ST. LOUIS invites applications for a tenure-track position in Accounting for Fall 2000, rank and salary dependent on qualifications. Candidates with primary research and teaching interests in Auditing and secondary interest in Accounting Systems preferred. Quality research and teaching expected. Candidates should possess a Ph.D. in Accounting or expect to complete degree by September 2000. Professional certification desirable. Senior appointment requires strong publication record. Campus enrollment is 12,000 students with approximately 2,500 enrolled in AACSB-accredited undergraduate and Master's business and accounting programs. Pleasant suburban location. Send application to Professor Silvia Madeo, Area Coordinator; School of Business Administration; University of Missouri-St. Louis, 8001 Natural Bridge Road; St. Louis, MO 63121-4499. UM-ST. Louis is an Affirmative Action/Equal Opportunity Employer committed to excellence through diversity.

405 INTERNATIONAL UNIVERSITY OF JAPAN. M.B.A. Program. Accounting Position Announcement. The Graduate School of International Management (M.B.A. Program), the International University of Japan (IUJ), will have opening(s) in Accounting in April 2000, and is seeking qualified candidates in all ranks on a two- to three-year term contract basis. The successful candidates are expected to hold both a Ph.D. in Accounting and a demonstrated record of high quality research. Our preference will be given to those who are willing to take a leadership role in the area of Accounting and would be interested in Japanese and Asian business. Those who are interested in applying for these positions should send a letter of application, a *curriculum vitae*, and recent publications or research papers to Faculty Search Committee, Graduate School of International Management, International University of Japan, Yamato-machi, Minamiuonuma-gun, Niigata 949-7277, JAPAN. Phone: +81-257-79-1406; Fax: +81-257-79-4443; email: hiura@iuj.ac.jp; URL: http://www.iuj.ac.jp.

406 BENTLEY COLLEGE invites applications for a Trustee Professor. We anticipate that applicants currently are Assistant or Associate Professors who, if appointed, will enter as an Associate Professor with tenure. The term as Trustee Professor will be five years and is renewable. We seek a truly outstanding individual poised to provide leadership in advancing use of information technology in teaching/scholarship. Appointee will teach one course/semester, including cross-functional courses, and will participate extensively in program development. Bentley is located 10 miles west of Boston. Nearly 8,000 students learn in an environment that integrates information technology with a broad business and liberal arts curriculum, preparing for careers in a global economy. (Please visit www.bentley.edu.) For best consideration, apply by 11/15/99 to Vice President H. Lee Schlorff, Bentley College, 175 Forest Street, Waltham, MA 02452-4705. An EOE building strength through diversity, we welcome applications from underrepresented groups.

407 KING'S COLLEGE invites applications for an Assistant Professor, tenure-track position, for Spring or Fall 2000. King's College is an independent liberal arts institution sponsored by Congregation of Holy Cross located in Wilkes-Barre on the western edge of the Pocono Mountains. The William G. McGowan School of Business has completed its third year of Candidacy for AACSB accreditation. Required: teaching interests in Financial/Managerial Accounting and Auditing and a completed Ph.D. or D.B.A. Successful applicant will teach undergraduate and graduate courses in day, evening and weekend classes. Applications consisting of teaching and research interests, *curriculum vitae*, transcripts, and three letters of recommendation should be submitted to Edward J. Schoen, Dean, McGowan School of Business, King's College, 133 North River Street, Wilkes-Barre, PA 18711. We are an Equal Opportunity Employer and specifically invite and encourage applications from women and minorities.

408 UNIVERSITY OF NORTHERN IOWA invites applicants for two tenure-track positions (Financial Accounting) beginning Fall 2000. Rank is open. A doctorate (ABDs considered) from an AACSB-accredited institution, teaching excellence and scholarship potential are required. Professional certification is desirable. The AACSB-accredited College of Business Administration (CBA) has 72 full-time faculty, 1,300 undergraduate majors and 60 M.B.A. students. Applications must be received by November 1, 1999 to be given full consideration. Contact: Professor Gerald Smith, Head, Department of Accounting, College of Business Administration, University of Northern Iowa, Cedar Falls, IA 50614-0127; Phone: (319) 273-2394; Fax: (319) 273-2922; Email: Gerald.Smith@uni.edu. The University of Northern Iowa is an inclusive academic community, hospitable to all. The University is an Equal Opportunity Employer with a comprehensive plan for affirmative action.

409 SAN JOSE STATE UNIVERSITY invites applications for Fall 2000 for three tenure-track Accounting positions as Associate or Assistant Professor or temporary appointment as Visiting Professor as Lecturer with an emphasis in: (1) Financial Accounting, (2) Accounting Information Systems, (3) Management Accounting. The candidate must have demonstrated versatility in subject matter competencies and pedagogy. The teaching assignment is at both graduate and undergraduate levels including traditional and accelerated formats. The positions are subject to final approval by the University. The minimum credential requirement is Ph.D. for tenure-track appointments, and an M.B.A. for temporary appoinments. Strong preference will be given to candidates who hold a Ph.D. from an AACSB-accredited university. The application deadline is October 30, 1999 or until the position is filled. Send application letter, resume, three letters of reference to Dr. Joseph Mori, College of Business, San Jose State University, One Washington Square, BT850, San Jose, CA 95192-0066; Telephone (408) 924-3460; Email: mori_j@cob.sjsu.edu. San Jose State University is an Equal Opportunity/Affirmative Action Employer.

410 RUTGERS UNIVERSITY, School of Business-Camden, invites applications for tenure-track faculty positions in the areas of Accounting Information Systems and/or Auditing. The rank is open. The candidate should be capable of high quality research and teaching at both the undergraduate and graduate levels. The school is AACSB-accredited. The normal teaching load is two courses (sections) per semester. Salary is competitive and commensurate with qualification. A doctorate in Accounting is required or expected. The University is located in Southern New Jersey and is less than two miles from downtown Philadelphia, with easy access to New York and Washington, D.C. The positions will remain open until filled. Interested candidates should send resumes to Emeka T. Nwaeze, The Accounting Area Coordinator, School of Business, Rutgers University, Camden, NJ 08102; Phone: (856) 225-6651. Rutgers University values diversity and encourages women and ethnic minorities to apply. Rutgers University is an Affirmative Action/Equal Opportunity Employer.

411 RUTGERS UNIVERSITY, School of Business-Camden, invites applications for a visiting faculty position in the areas of Accounting Information Systems and/or Auditing. The candidate should be capable of high-quality research and teaching at both the undergraduate and graduate levels. The school is AACSB-accredited. The teaching load for visiting faculty is generally three sections per semester. Salary is competitive and commensurate with qualification. The University is located in Southern New Jersey and is less than two miles from downtown Philadelphia, with easy access to New York and Washington, D.C. The positions will remain open until filled. Interested candidates should send resumes to Emeka T. Nwaeze, The Accounting Area Coordinator, School of Business, Rutgers University, Camden, New Jersey 08102; Phone: (856) 225-6651. Rutgers University values diversity and encourages women and ethnic minorities to apply. Rutgers University is an Affirmative Action/Equal Opportunity Employer.

412 PENNSYLVANIA STATE UNIVERSITY'S CAPITAL COLLEGE School of Business Administration invites applications for a tenure-track accounting position at Assistant or Associate Professor level beginning Fall 2000. Doctorate in Accounting from an AACSB-accredited school required (ABDs will be considered). Teaching load 9/9 following 9/6 first two years. Requirements: teaching graduate/undergraduate courses in Cost and Managerial Accounting. Primary responsibilities are in Harrisburg, with possible teaching at Schuylkill campus. A strong commitment to both effective teaching and publication is required. Professional certification (CMA, CPA or equivalent) and prior teaching, research, professional experience preferred. The school is AACSB-accredited; compensation is AACSB competitive. Reviews begin October 31, 1999; continuing until position is filled. Send *curriculum vitae* and list of references to Managerial/Cost Accounting Search Committee, c/o Dorothy Guy, Penn State Harrisburg, Box AR, 777 W. Harrisburg Pike, Middletown, PA 17057-4898. Penn State is committed to Affirmative Action, Equal Opportunity, and the diversity of its workforce.

413 COLUMBIA BUSINESS SCHOOL seeks applications for faculty positions in Accounting. Rank is open. Candidates with an interest in Financial Accounting will be preferred. Qualified applicants will possess a doctoral degree (or be close to completion) and evidence a strong commitment to both teaching and research. We offer a highly supportive research environment and easy interaction with faculty in other disciplines. Salary and benefits are competitive. Please send resume and a research paper to Trevor Harris, Columbia Business School, 3022 Broadway, 610 Uris Hall, New York, NY 10027. Columbia Business School is an Equal Opportunity/Affirmative Action Employer. Women and minorities are especially encouraged to apply.

414 UNIVERSITY OF RICHMOND, E. Claiborne Robins School of Business, invites applications for a tenure-track position, beginning August 2000. Applicants should possess a Ph.D./D.B.A. in Accounting or be in the final stages of completion. Candidates with teaching interests in Cost/Managerial Accounting and/or International Accounting are preferred. The University is a highly selective private university located in a residential area of Richmond, Virginia. The School of Business and Accounting Department are AACSB-accredited. Please visit our web site at www.richmond.edu. Applicants should send a resume to Robert H. Sanborn, E. Claiborne Robins School of Business, University of Richmond, Richmond, VA 23173. EOE.

415 UNIVERSITY OF LETHBRIDGE, Faculty of Management, in Lethbridge, Alberta, Canada, is seeking to fill one or more tenure-track positions in Accounting starting in July 2000 (the level of the position is open). The position requires individuals who are completing a Ph.D. or are A.B.D. in Accounting. Applicants must have a commitment to effective and innovative teaching and have demonstrated an ability to conduct scholarly research. The Faculty seeks candidates who are able to teach financial accounting and/or audit, and who are attracted to a position which provides a balance between research and teaching. Applicants should send a letter of application and a current resume to Dr. Toni Nelson, Associate Dean, Faculty of Management, University of Lethbridge, 4401 University Drive, Lethbridge Alberta, Canada, T1K 3M4 or email: nelson@uleth.ca.

416 UNIVERSITY OF ARKANSAS at Little Rock (www.ualr.edu) invites applications for the currently available tenure-track position as chair of the Department of Accounting. This position will remain open until filled. The actual date the position is assumed is flexible and will be by mutual agreement between the university and the selected candidate. Candidates must have a doctorate from an AACSB-accredited university with a concentration in Accounting and provide evidence of effective teaching and publishing. Professional accounting certification and tenure at a previous institution are strongly desired. Applicants should submit credentials to Dr. Robert B. Mitchell, Department of Management; University of Arkansas at Little Rock; 2801 South University; Little Rock, AR 72204; email: rbmitchell@ualr.edu; phone: (501) 569-3383. The vitae should provide names of at least three references and procedures for contacting them. The College of Business Administration is AACSB-accredited at the undergraduate and graduate levels. AA/EEO.

417 UNIVERSITY OF HOUSTON, Department of Accountancy and Taxation, seeks applications for multiple tenure-track appointments at the Assistant Professor level for the 2000-2001 academic year. A doctoral degree (or near completion) and a strong commitment to both research and teaching are required. All areas are highly encouraged to apply, but the strongest teaching needs are in Tax Accounting and Information Systems. The business school and the department are AACSB-accredited. Salaries are competitive. Please send resume and a research paper to Thomas R. Noland, College of Business Administration, University of Houston, Houston, TX 77204-6283, or by email to tnoland@uh.edu. The University of Houston is an Equal Opportunity/Affirmative Action Employer. Women, minorities, veterans, and individuals with disabilities are encouraged to apply.

418 ARIZONA STATE UNIVERSITY WEST, Assistant/Associate Professor of Accountancy. ASU West School of Management (SOM) is currently seeking a tenure-track faculty member to teach accounting information system courses at the undergraduate and M.B.A. levels. Required: Doctorate in Accountancy or related field by 8/16/00; evidence of teaching effectiveness in accounting commensurate with level of appointment; evidence of experience in teaching accounting information systems; achievement in scholarship commensurate with level of appointment. Desired: Evidence of experience in and desire to teach a second area of accounting; evidence of funded research; experience in consulting/industry; evidence of web-based or online teaching. Deadline: 9/30/99 or the 30th of every month until filled. Email a letter of interest, *curriculum vitae*, and names of three professional references to william.duncan@asu.edu. AA/EOE.

419 OKLAHOMA STATE UNIVERSITY, School of Accounting, announces the Myers Endowment for Excellence Chair in Accounting Information Systems and seeks applicants for this position at the Associate Professor or Full Professor rank. Applicants should possess a distinguished record of research and teaching and be capable of providing outstanding leadership to the School and College in the information systems area. Activities of the chairholder are expected to include teaching and assisting in developing curriculum in the systems area, conducting scholarly research, and participating in the doctoral program. Applicant screening will begin on December 1 and continue until the position is filled. Resumes and application letters should be sent to Lanny Chasteen, Head, School of Accounting, Oklahoma State University, Stillwater, OK 74078, or by email to lcelvis@okstate.edu. OSU is an Equal Opportunity/Affirmative Action Employer.

420 UNIVERSITY OF NEBRASKA-LINCOLN, School of Accountancy, invites applications for Assistant Professor of Accountancy. Responsibilities include: teaching at the undergraduate and graduate (M.B.A., M.P.A., Ph.D.) levels in financial accounting or auditing, conducting a program of research and scholarly activity leading to publication in referred journals, and participating in professional and university service activities. Applicants should have a Ph.D. or D.B.A. in accounting or be near completion of a degree. The CPA or CMA designation is desirable. The appointment will begin Fall 2000. Salary is competitive. Initial screening of candidates will begin on November 15, 1999 and will continue until the position is filled. Applications (including resume and names of three references) should be directed to Professor Thomas E. Balke, College of Business Administration, University of Nebraska-Lincoln, Lincoln, NE 68588-0488; Phone: (402) 472-2337; Fax: (402) 472-4100; Email: tbalke@unl.edu. Information about the college and school is available at our web site: http://www.cba.unl.edu. The University of Nebraska is committed to a pluralistic campus community through Affirmative Action and Equal Opportunity and is responsive to the needs of dual career couples. We assure reasonable accommodation under the Americans with Disabilities Act; contact Tom Balke at (402) 472-2337 for assistance.

421 UNIVERSITY OF NEBRASKA-LINCOLN, School of Accountancy, invites applications for the Deloitte and Touche Professorship at the Associate or Full Professor rank. The school seeks an individual who will provide leadership in research, collaboration with colleagues and doctoral students, and teaching (preferably financial accounting or auditing) at the undergraduate and graduate levels. Applicants in all areas with a demonstrated record of research and teaching and a promise of significant future contributions are encouraged to apply. The appointment will begin Fall 2000. Salary is competitive and commensurate with qualifications. The normal teaching load is two courses (sections) per semester. Initial screening of candidates will begin November 15, 1999 and will continue until the position is filled. Inquiries, nominations, and applications (including resume and names of three references) should be directed to Professor Thomas E. Balke, College of Business Administration, University of Nebraska-Lincoln, Lincoln, NE 68588-0488; Phone: (402) 472-2337; Fax: (402) 472-4100; Email: tbalke@unl.edu. Information about the college and school is available at our web site: http://www.cba.unl.edu. The University of Nebraska is committed to a pluralistic campus community through Affirmative Action and Equal Opportunity and is responsive to the needs of dual-career couples. We assure reasonable accommodation under the Americans with Disabilities Act; contact Tom Balke at (402) 472-2337 for assistance.

422 DUQUESNE UNIVERSITY invites applicants for a Tax Accounting/Director of MS in Taxation Program beginning Fall 2000 or sooner. Candidate should have tax experience, excellent teaching and administrative skills, an established publication record and academic qualifications to teach at the M.S.T. level. Duties include maintaining and developing strong ties to the professional tax community, monitoring curriculum, and advising students. The School is accredited by the AACSB. Duquesne is a private Catholic university, ranked among the top ten Catholic universities in the United States by *U.S. News and World Report*. Located in Pittsburgh, PA, Duquesne's campus spans a 40-acre hilltop and is a five-minute walk from downtown Pittsburgh. There are approximately 1,000 undergraduate and 550 M.B.A. students. For consideration, submit letter of application and current *curriculum vitae* to Professor Sharon Green, Director of Accounting Programs, A. J. Palumbo School of Business Administration, Duquesne University, Pittsburgh, PA 15282. Duquesne University is an Equal Opportunity/Affirmative Action Employer.

423 DUQUESNE UNIVERSITY invites applicants for a tenure-track position beginning Fall 2000 or sooner. A Ph.D. in Accounting or related field by May 31, 2000 is required. Professional certification is desirable. Evidence of high-quality teaching and is expected. Expertise in Accounting Information Systems is preferred, but strong consideration will be given to individuals who teach Financial Accounting courses. The School is accredited by the AACSB. Duquesne is a private Catholic university, ranked among the top ten Catholic universities in the United States by *U.S. News and World Report*. Located in Pittsburgh, PA, Duquesne's campus spans a 40-acre hilltop and is a five-minute walk from downtown Pittsburgh. There are approximately 1,000 undergraduate and 550 M.B.A. students. For consideration, submit letter of application and current *curriculum vitae* to Professor Sharon Green, Director of Accounting Programs, A. J. Palumbo School of Business Administration, Duquesne University, Pittsburgh, PA 15282. Duquesne University is an Equal Opportunity/Affirmative Action Employer.

424 PEPPERDINE UNIVERSITY, The George L. Graziadio School of Business and Management, is seeking candidates for a tenure-track faculty position in Accounting. Candidates must have a Ph.D. or D.B.A. in Accounting from an AACSB-accredited school, teaching and business experience, professional certification, and some professional publications. We encourage financial, managerial, and information systems studies. Excellence in teaching is expected. Salary is competitive. In addition to the primary campus in Malibu, GSBM has five centers in the general Los Angeles area. Seventy-five percent of the students are graduate level; 80 percent attend the evening programs. Interested candidates should send a letter of application, current resume, and letters of recommendation to Linnea McCord, Chairperson, Department of Accounting, Finance, and Law, The George L. Graziadio School of Business and Management, 400 Corporate Pointe, Culver City, CA 90230. Deadline for receipt of materials is November 30, 1999. Pepperdine University is an Equal Opportunity Employer.

425 SINGAPORE MANAGEMENT UNIVERSITY, Singapore's newest university, will launch its academic degree programs in July 2000 in Finance, Business, and Management. SMU, government-funded, has signed an agreement with Wharton School to collaborate on academic development and research. Faculty positions (Professor, Associate Professor, and Assistant Professor) are available in the areas of Financial Accounting, Management Accounting, Auditing, International Accounting, Accounting Theory, Income Tax, and Tax Planning. Applicants should hold Ph.D. degrees from reputable universities and demonstrate research and teaching abilities. Interested applicants should send detailed *curriculum vitae* (including email address), academic transcripts, a statement of research and teaching interests, and three references to Director, Human Resources, Singapore Management University, Planning Office, 211 Upper Bukit Timah Road, Singapore 588182; Fax: (65) 4638125; Email: elee@smu.edu.sg, Web site: http://www.smu.edu.sg.

426 BARUCH COLLEGE, The Stan Ross Department of Accountancy, invites applications for anticipated positions in Accounting and Taxation for tenure-track positions at all ranks. Rank and salary are dependent on qualifications. For positions as an Assistant Professor, candidates should have a doctoral degree in accounting or be close to completion of that degree. For ranks above Assistant Professor, the requirements are a record of publication, demonstrated teaching effectiveness, and a desire to work with doctoral students. Priority will be given to candidates in the area of Auditing. Please submit *curriculum vitae* and recent work of a research proposal by February 15, 2000 to Professor Masako Darrough, Baruch College, 17 Lexington Avenue, Box E-0725, New York, NY 10010. An AA/EO/IRCA/ADA employer.

427 GEORGIA STATE UNIVERSITY, The School of Accountancy, will be recruiting for two tenure-track positions during the 1999-2000 academic year. All levels and interests will be considered, but interests in Managerial Accounting and Auditing are preferred. Assistant professor candidates must have a doctorate in Accounting or have completed requirements by the employment date. Associate Professor and Professor candidates must have a very strong record in scholarly research and teaching. Salaries are competitive. All positions are contingent upon final budget approval by the university. Send letter of application and *curriculum vitae* or nominations to Jane F. Mutchler, Director, School of Accountancy, Georgia State University, PO Box 4050, 35 Broad Street, Fifth floor, Atlanta GA 30302-4050. Preference will be given to applications received by January 30, 2000. Georgia State University is an Equal Opportunity Educational Institution/Affirmative Action Employer.

428 UNIVERSITY OF CALIFORNIA, Irvine, Graduate School of Management, is seeking candidates for a position as a tenure-track Assistant Professor of Accounting to begin July 1, 2000. Candidates must have a Ph.D. or be in the final stages of dissertation completion, and have a strong commitment to both research and teaching (primarily M.B.A. classes). Candidates from all areas of research and teaching will be considered. Salaries are competitive. Applicants should submit their dissertation proposal, *curriculum vitae*, letters of recommendation, publications and/or working papers and teaching evaluations to Professor William F. Wright, Accounting Search Committee, Graduate School of Management, University of California, Irvine, CA 92697-3125. Under federal law, the University of California may employ only individuals who are legally authorized to work in the United States as established by providing documents specified in the Immigration Reform and Control Act of 1986. UCI is an Equal Opportunity Employer committed to excellence through diversity.

429 ST. JOHN'S UNIVERSITY/COLLEGE OF SAINT BENEDICT, Department of Accounting, seeks applicants for a tenure-track position in Accounting beginning September 2000. Minimum requirement M.B.A./CPA. Experience in Accounting; strong computer skills desirable. Candidate should be an effective teacher in our undergraduate accounting courses; qualified in Financial Accounting (intermediate/advanced) and Governmental/Not-for-Profit accounting. Saint John's University, a liberal arts college for men, and The College of Saint Benedict, a liberal arts college for women, are coordinate institutions located 70 minutes northwest of Minneapolis/St. Paul. Salary and rank open. Submit letter of application, *curriculum vitae*, three recent letters of recommendation, statement of teaching philosophy, official transcripts to College of St. Benedict, Human Resources, St. Joseph, MN 56374. Application deadline is October 15, 1999 or until the position is filled. Women and people of diverse racial, ethnic, and cultural backgrounds are encouraged to apply. SJU/CSB are EEO/AA Employers.

430 UNIVERSITY OF UTAH, School of Accounting, expects a position for a new faculty member, pending funding, beginning in the 2000-2001 academic year. Strong preference for applicants in the area of Information Systems. Applicants should possess a doctorate or be close to completion. Rank will be considered subject to qualifications and school needs. Salaries, research support, and teaching loads are competitive and fringe benefits are excellent. The School of Accounting and the David Eccles School of Business are both accredited at the undergraduate and graduate levels by the AACSB. Bachelor's, Master's of Accounting, and Ph.D. programs are offered. The application deadline is February 1, 2000, or until the position is filled. Please send application including proposal or working paper, *curriculum vitae*, and three letters of reference to Martha M. Eining, Director, School of Accounting, 1645 E. Campus Center Dr., Rm. 101, University of Utah, Salt Lake City, Utah 84112. The University of Utah is an EO/AA Employer and encourages applications from women and minorities and provides reasonable accommodations to the known disabilities of employees.

431 UNIVERSITY OF MARYLAND invites applications for a tenure-track/tenured position in Accounting Information Systems and Information Security, to start in August 2000. A strong research record is required. Send a *curriculum vitae*, three letters of recommendation, and evidence of research to Professor Oliver Kim, The Robert H. Smith School of Business, University of Maryland, College Park, MD 20742-1815. The University of Maryland is an Equal Opportunity/Affirmative Action Employer. Women and minorities are especially encouraged to apply.

432 UNIVERSITY OF MARYLAND seeks applicants for a continuing nontenure-track teaching position in Accounting. The position is for nine months beginning Fall 2000, and is renewable subject to performance. Off-term teaching is available. Candidates must possess a doctorate and an excellent teaching record, especially at the Master's level. Teaching breadth will be valued. Certain student support and service responsibilities will be expected. Send a *curriculum vitae*, three letters of recommendation, and evidence of teaching effectiveness to Professor Oliver Kim, The Robert H. Smith School of Business, University of Maryland, College Park, MD 20742-1815. The University of Maryland is an Equal Opportunity/Affirmative Action Employer. Women and minorities are especially encouraged to apply.

433 PLATTSBURGH STATE UNIVERSITY OF NEW YORK invites application for two tenure-track positions for Spring or Fall 2000 at the Assistant or Associate Professor levels. Applicants at the Assistant level must have doctoral degree (or near completion) in Accounting. Applicants at the Associate level must have an earned doctorate in Accounting, a record of recently published research, and minimum of three years teaching experience. CPA and other certifications are desired. A commitment to teaching effectiveness is emphasized and scholarly activity is required. Teaching responsibility open to all areas of accounting, auditing, information systems, and taxation. Review of applications continues until positions filled. Please send letter of application, *curriculum vitae*, names and addresses of three references to Chair, Accounting Search Committee (PJ # 2313/2314-5717), c/o HR Office, Plattsburgh State University of New York, 101 Broad Street, Plattsburgh, NY 12901-2681; Fax: (518) 564-5060. Women and minorities are encouraged to apply.

434 SIMON FRASER UNIVERSITY, The Faculty of Business Administration, invites applications for tenure-track appointments in Financial Accounting and Managerial Accounting. Ph.D. in hand or near completion. Rank: Assistant/Associate. Salary: competitive within Canada. Successful candidates will have strong research and teaching abilities with established research programs in one of the above areas and an interest in teaching at undergraduate/graduate/executive levels. Start date: September 2000 or mutually agreed upon time. Positions subject to budgetary approval. Send *curriculum vitae* and names of three references to Diane Lesack, Assistant to Appointments Committee Chair, Faculty of Business Administration, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia V5A 1S6 Canada. Email: lesack@sfu.ca; Fax: 604-291-5833; Web sites: http://www.sfu.ca and http://www.bus.sfu.ca. In accordance with Canadian Immigration requirements, this announcement is directed, in first instance, to Canadian Citizens and Permanent Residents. SFU is committed to principle of equity in employment and offers equal employment opportunities to qualified applicants.

435 NAVAL POSTGRADUATE SCHOOL, Department of Systems Management, seeks applicants for a tenure-track faculty position in Accounting at the Assistant or Associate rank, beginning in Fall 2000. Candidates should possess a Ph.D./D.B.A. (or be near completion); have excellent teaching ability and a commitment to research. Candidates at the Associate rank should have an established research record. Preference will be given to candidates with interests in Management Accounting. Responsibilities include graduate-level teaching, master's thesis advising, conducting field research, and publication. The Department of Systems Management is a graduate department with over 50 full-time faculty, offering accredited Master's degree programs in Management. Students include U.S. and international military officers and government civilians. Send *curriculum vitae* and the names of three references to Professor Reuben T. Harris, Chair, Department of Systems Management, Naval Postgraduate School, 555 Dyer Road, Monterey, CA 93943. The Naval Postgraduate School is an Equal Opportunity/Affirmative Action Employer.

436 UNIVERSITY OF NEW ORLEANS invites applications for an anticipated Assistant Professor position for Fall 2000. Preference will be given to those with a teaching interest in the financial accounting and theory areas at the undergraduate and graduate levels. Candidates must have the Ph.D. with an Accounting major (or ABD in the same area with completion of the Ph.D. by the end of 2000). Salary is negotiable and competitive. The Department offers the undergraduate accounting degree (over 500 majors) and two Master's degrees (including a Tax Option). The Department has separate AACSB accounting accreditation at both the graduate and undergraduate levels. Candidates should send a resume to Professor Philip J. Harmelink, Chairman, Department of Accounting, College of Business Administration, University of New Orleans, New Orleans, LA 70148. The University of New Orleans is a member of the Louisiana State University System and an Affirmative Action/Equal Opportunity Employer.

437 SAINT JOSEPH'S UNIVERSITY, Department of Accounting in the Haub School of Business, invites applications for an anticipated tenure-track opening to begin August 2000. Applicants with a specialty in Accounting Information Systems will be considered at the Assistant and Associate rank. The position requires that the doctoral degree in Accounting be completed, or near completion by the date of appointment; CPA is desired. Faculty are expected to teach undergraduate and graduate courses, be actively involved in academic research, and provide service to the profession and the university. Review of applications will begin August 1, 1999. St. Joseph's University is a private, Catholic, Jesuit institution with a business day and evening enrollment of 3,500. Please send a letter of application, *curriculum vitae*, and references to Joseph M. Ragan, Chair, Department of Accounting, Saint Joseph's University, 5600 City Avenue, Philadelphia, PA 19131-1395; Phone: (610) 660-1654.

438 WASHINGTON UNIVERSITY, John M. Olin School of Business, is seeking faculty in accounting at all levels starting Fall 2000. The qualifications include a demonstrated interest in and capacity to do research publishable in leading accounting journals and a high level of teaching competence in graduate and undergraduate classes. Candidates should hold a doctorate degree or be very near completion. Salary and faculty support are highly competitive. The Olin School has excellent physical, computing, and library facilities. Each application should include a *curriculum vitae* and a copy of the dissertation proposal (or the completed dissertation); more established scholars should include several samples of their scholarship. Send all materials to Dean Stuart I. Greenbaum, John M. Olin School of Business, Washington University, Campus Box 1133, One Brookings Drive, St. Louis, MO 63130-4899. Washington University is an Equal Opportunity/Affirmative Action Employer and welcomes applications from women and minorities.

439 UNIVERSITY OF SOUTHERN MAINE, Department of Accounting, invites applications for a tenure-track position at the Assistant Professor rank starting September 1, 2000. (A January 1, 2000 start may be possible.) The position will emphasize Financial Accounting with a secondary teaching area expected. Teaching effectiveness is emphasized with scholarly activity expected. The ideal candidate will have completed requirements for a Ph.D. or D.B.A. with concentration in accounting. Professional experience and CPA/CMA are positive additional factors. Send letter of application, *curriculum vitae*, and names and telephone numbers of three references to Dr. Steve Jackson, University of Southern Maine, School of Business, Department of Accounting, 96 Falmouth St., Box 9300, Portland, Maine 04103; Fax (207) 780-4662. USM seeks candidates with a strong commitment to diversity and who are supportive of a welcoming work/classroom environment. EO/AA.

440 UNIVERSITY OF ILLINOIS, Department of Accountancy, is recruiting faculty for tenure-track appointments with special emphasis on appointments at the Associate and Full Professor levels. Applicants for Senior positions should have a strong research record and the ability to participate in doctoral education and curriculum development at the undergraduate and graduate levels. In addition, nontenure-track lecturer and visiting positions may become available. Applicants should submit a resume, which lists research publications and courses taught. Compensation is competitive and will be commensurate with the appointment level and applicant's record. To ensure full consideration, applications should be received by November 1, 1999. Correspondence and resumes should be sent to Professor Gene Willis, Head, Department of Accountancy, 360 Commerce West, College of Commerce and Business Administration, University of Illinois, 1206 S. Sixth Street, Champaign, IL 61820. The Department of Accountancy is an Affirmative Action Employer and encourages applications from members of minority groups.

441 UNIVERSITY OF ARKANSAS, Sam M. Walton College of Business Administration, is seeking to fill a tenure-track position in Auditing beginning in August 2000. Rank is open and salary is competitive. Applicants for this position must have a Ph.D. in Accounting, demonstrated research productivity (or outstanding research potential for entry-level applicants), and a strong commitment to excellence in graduate and undergraduate teaching. Experienced candidates are preferred, but entry-level candidates will be considered. Computer assistance, research support, and summer teaching are available. Send letter of application, resume, and supporting materials to Professor G. William Glezen, Chair of Recruiting Committee, Department of Accounting, Sam M. Walton College of Business Administration, University of Arkansas, Fayetteville, AR 72701; Phone: (501) 575-6119. An Equal Opportunity/Affirmative Action Institution. Must have proof of legal authority to work in the United States.

442 UNIVERSITY OF ALBERTA, Faculty of Business, invites applications for full-time positions in Accounting, beginning July 1, 2000. Ph.D. or equivalent required. Salary and rank depend on experience and qualifications. Competition remains open until the positions are filled. Send resumes to James C. Gaa, Chair, Department of Accounting & MIS, Faculty of Business, University of Alberta, Edmonton Alberta T6G 2R6, Canada. The University of Alberta is committed to the principle of equity in employment. As an employer, we welcome diversity in the workplace and encourage applications from all qualified women and men, including Aboriginal peoples, persons with disabilities, and members of visible minorities.

443 STANFORD UNIVERSITY, Graduate School of Business, invites applications for three faculty positions in Accounting effective September 2000. We seek candidates in Managerial Accounting at the Full or tenured Associate Professor level. We also seek nontenured candidates interested in Managerial Accounting, Tax and other areas that will diversify our research and teaching portfolio. Candidates must have a Ph.D. or a dissertation in process, and a high level of accomplishment or promise in both scholarly research and graduate-level (M.B.A. and Ph.D.) teaching. Applications should include *curriculum vitae*, copies of research publications, and three confidential letters of reference. Applicants at the Assistant Professor level should also include transcripts from universities attended. Applications must be forwarded in their entirety to the Faculty Recruiting Coordinator, Box A, Graduate School of Business, Stanford University, Stanford, CA 94305-5015. Deadline for receipt of materials is November 1, 1999. Stanford University is an Equal Opportunity Employer and seeks applications from women and ethnic minorities.

444 MICHIGAN STATE UNIVERSITY, Department of Accounting, is seeking to hire two tenure-track faculty members in the area of Information Systems for August 2000. One position is posted at the Assistant/Associate level while the other is open to all ranks. For one position, teaching responsibilities involve a flexible range of graduate IS courses; the other position is targeted for undergraduate teaching in Accounting Systems with a strong enterprise modeling and database orientation. These positions require a doctoral degree either in Information Systems or in Accounting with very strong IS training. Candidates are asked to submit a *curriculum vitae* and a defended dissertation proposal (or working paper) before December 20, 1999 to Professor William E. McCarthy, Department of Accounting, N270 North Business Complex, Michigan State University, East Lansing, MI 48824-1121; Email: mccarth4@pilot.msu.edu. Michigan State is an Affirmative Action/Equal Opportunity Institution. Handicappers have the right to request and receive reasonable accommodation.

445 YORK COLLEGE OF PENNSYLVANIA invites applications for a tenure-track position in Accounting. The position is targeted at the Assistant Professor level, with primary teaching responsibilities in the Financial Accounting sequence. Applicants should be doctorally qualified, and professional certification (CPA or CMA) with career experience is desirable. The mission of York College is teaching, which means that the successful candidate will have teaching experience and excellent teaching evaluations. The successful candidate will also have a commitment to continued scholarship and the professional development of our students. York College's business programs are AACSB-accredited, and serve approximately 900 full-time students. Applicants should send *curriculum vitae*, evidence of teaching excellence and three letters of reference to Dr. Mary C. Meisenhelter, Chair, Department of Business Administration, York College of Pennsylvania, York, PA 17405-7199. York College is an Equal Opportunity Employer.

446 LEHIGH UNIVERSITY seeks two well-trained scholars/teachers with strong research skills to join its Accounting faculty on tenure tracks in Fall 2000, and begin publishing in major refereed journals. A new dean with national aspirations, a college reorganization, an emerging M.S. in Accounting program, and a growing Accounting Department make this a great time to consider Lehigh! Our greatest needs are in Financial Accounting and Reporting, and Auditing and Business Assurance Services, but we will also consider applicants in other areas of Accounting. We prefer those who recently completed or who are in the final stages of research-oriented doctoral programs. Applications will be accepted until the positions are filled. If interested, send your *curriculum vitae*, list of references, dissertation proposal, or other scholarly work to Dr. Kenneth P. Sinclair, Chair, Department of Accounting, Lehigh University, 621 Taylor Street, Bethlehem, PA 18015-3117; Email: kps1@lehigh.edu. Qualified women and minority candidates should apply. Lehigh University is an Equal Employment/Affirmative Action Employer.

447 YORK UNIVERSITY, Toronto, Schulich School of Business, is seeking tenure-stream faculty in Accounting at the Assistant, Associate or Full Professor levels, for July 1, 2000. Preferred candidates will: be qualified to teach in Financial or Managerial Accounting-expertise in teaching International Accounting would be beneficial; possess a completed doctorate or be close to completion; provide evidence of effective teaching; have a commitment to scholarly research and publication; be willing to use cases in teaching. Salary and benefits are competitive. This position is subject to budgetary approval. Please send *curriculum vitae* to Professor L. S. Rosen, Schulich School of Business, York University, Toronto Ontario M3J 1P3, Canada. York University has a policy of employment equity, including affirmative action for women faculty.

448 WASHINGTON STATE UNIVERSITY invites applications for an Assistant Professor of Accounting position in the areas of Cost and Managerial Accounting that is available beginning August 16, 2000. Requires a doctorate or ABD in Accounting, a record of published research or research potential, and effective teaching. A research interest in Managerial Accounting is desirable. Experience teaching Cost/Managerial Accounting is highly desirable. Six-hour teaching load, summer research support, competitive salary, and excellent fringe benefits. Review of applications begins February 26, 2000 and continues until the position is filled. Send letter of application, resume, student teaching evaluations (or summary), recent research paper, and three letters of recommendation to Accounting Search Chair; School of Accounting, Information Systems, and Business Law; Box 644729; Washington State University; Pullman, WA 99164-4729. WSU is an EO/AA Educator and Employer. Protected groups are encouraged to apply.

449 CLAREMONT GRADUATE UNIVERSITY invites nominations and applications for an anticipated faculty position in Financial Accounting and Cost Management in the Peter F. Drucker Graduate School of Management. The position includes responsibility for research and teaching at both the M.B.A. and the Executive Management levels. Candidates must have a doctoral degree; a strong record of scholarship; an interest in diverse approaches, students and populations; and a demonstrated ability to make their intellectual contributions accessible to experienced managers through teaching and published work. Candidates also should have an interest in supervising the research of diverse students with considerable management experience. Executive level management or consulting experience is desirable. For further information about this opportunity, visit our website at www.drucker.cgu.edu.

450 EMPORIA STATE UNIVERSITY, School of Business, seeks to fill two tenure-track positions beginning January or August 2000. Responsibilities include teaching undergraduate and graduate courses and conducting research that leads to publication. Individuals with an interest in Auditing, Accounting Information Systems, or Tax are especially encouraged to apply. Doctorate in Accounting required, certifications and university teaching experience in Accounting with documentation evidencing a high level of classroom effectiveness is highly desirable, as is a demonstrated record of successful publication. Screening will begin November 15, 1999, and continue until the position is filled. Send letter of application, *curriculum vitae*, and names, addresses, and telephone numbers of three references to Nitham Hindi, Chair, Division of Accounting and Computer Information Systems, Emporia State University, 1200 Commercial, Emporia, KS 66801-5087; Telephone: (316) 341-5346; Fax: (316) 341-6346; Email: hindinit@esumail.emporia.edu. AA/EOE.

451 LANDER UNIVERSITY, School of Business Administration, seeks applications for Assistant/Associate Professor of Accounting/Business Law, tenure-track position. Candidates should have M.P.A. or Master's in Taxation from AACSB-accredited school with J.D. and CPA, or LL.M. and CPA. Established record or interest in academic research, publication, and professional development required; practice and prior teaching experience desirable. Lander University has approximately 3,000 students, with 500+ undergraduate majors in the School of Business Administration. The School is staffed by 14 full-time faculty and offers instruction leading to the B.S. degree in business administration. Competitive salary, commensurate with education and experience. For information or application, send all inquiries and nominations to Dr. Doug Grider, Dean, School of Business Administration, Lander University, 320 Stanley Avenue, Greenwood, SC 29649-2099; Phone: (864) 388-8232; Email: dgrider@lander.edu; Fax: (864) 388-8020.

452 TULANE UNIVERSITY, A. B. Freeman School of Business, invites applications for tenured-track positions in Accounting at all levels, in the areas of Financial Accounting, Managerial Accounting, Taxation, and Information Management, to start in August 2000. The senior appointment needs a significant research and teaching record and is expected to do light administrative work as area coordinator. Please send *curriculum vitae*, three letters of recommendation, and evidence of research to Professor Chi-Wen Jevons Lee, A. B. Freeman School of Business, Tulane University, New Orleans, LA 70118-5669. Tulane is an Equal Opportunity Employer and seeks applications from women and ethnic minorities.

453 MICHIGAN STATE UNIVERSITY, Department of Accounting, invites applications for the Russell Palmer Professorship with an academic-year, Full Professor, tenured appointment beginning August 2000. Applicants could currently be a senior Associate Professor, but must be appointable as a Full Professor. Teaching and research interests must be in Financial Accounting. Applicants should have a distinguished record of scholarship and publication and a documented record of excellence in teaching financial accounting. Applicants are expected to assume a leadership role and collaborate with colleagues in teaching, research, and service activities. Send letter of application, resume, research papers and publications, and names of references to Professor Michael D. Shields, Eli Broad Professor of Accounting, Department of Accounting, The Eli Broad College of Business, N270A North Business Complex, Michigan State University, East Lansing, MI 48824-1121. For preliminary inquiries contact Professor Shields at (517) 432-2915 or Email: shields@msu.edu. Deadline for receipt of applications is October 15 or until the position is filled. MSU is an Affirmative Action/Equal Opportunity Institution. Handicappers have the right to request and receive reasonable accommodation.

454 UNIVERSITY OF SOUTH CAROLINA, School of Accounting, invites applicants for a tenure-track position for Fall 2000. We seek an Assistant Professor with an interest in Managerial/Financial Accounting, but we will accept applications from all ranks and areas. Applicants must possess a doctorate or be close to completion by August 2000. The School of Accounting has approximately 400 undergraduate majors (Juniors and Seniors) and 50 Master's students and offers B.S., Master's of Accountancy, Master's of Taxation, and Ph.D. degrees. Please submit a resume and a working paper or a defended dissertation proposal, if at the dissertation stage. Applications will be accepted until the position is filled. Submit applications to Professor Robert A. Leitch, School of Accounting, The Darla Moore School of Business, University of South Carolina, Columbia, SC 29208. The University of South Carolina is an Affirmative Action/Equal Opportunity Institution.

455 UNIVERSITY OF COLORADO AT BOULDER, Accounting Division, seeks an established and productive scholar for a tenure position at the Associate or Full Professor level for Fall 2000. We are most interested in persons who can support or supplement our research mission. Teaching needs include Managerial Accounting and Auditing, but we will fully consider applicants with other interests. We will begin reviewing applications no later than December 1, 1999, and will continue until the position is filled. Send a current *curriculum vitae*, list of references, copies of representative working papers, and evidence of teaching performance to Professor David Guenther, College of Business and Administration, Campus Box 419, University of Colorado at Boulder, Boulder, CO 80309-0419. The University of Colorado at Boulder strongly supports the principle of diversity. We are particularly interested in receiving applications from women, ethnic minorities, disabled persons, veterans and veterans of the Vietnam era.

456 NORTHERN MICHIGAN UNIVERSITY, Walker L. Cisler College of Business, invites applications for a tenure-track position in Accounting as Assistant/Associate Professor beginning Fall 2000. Teaching assignments include Accounting Principles and one or more of the following areas: Accounting Information Systems, Managerial Accounting, Auditing, Cost Accounting, Accounting for Nonprofit Enterprises, and Personal Financial Planning. Other responsibilities include scholarship, program development, advising, and service activities. Scholarly activities in the publications area are expected. Applicants must have a doctorate in accounting from an AACSB-accredited university. Professional designations such as CPA, CMA, and CFP as well as related experience in business and teaching are highly desirable. Send applications to Dr. Sue Rigby, College of Business, Northern Michigan University, Marquette, MI 49855. NMU is an Equal Opportunity/Affirmative Action Employer and is strongly committed to increasing the diversity of its faculty.

457 TEXAS CHRISTIAN UNIVERSITY invites applications for two Accounting Assistant (possibly Associate) positions. A Ph.D. or ABD is required. Our primary teaching needs are in Financial Accounting, Accounting Information Systems, Managerial Accounting, and perhaps Income Tax. TCU offers an excellent environment for new faculty-competitive salary and benefits, good research support and colleagues, and attractive teaching loads. TCU offers B.B.A., M.B.A., and Master of Accounting (MAc) programs that are AACSB-accredited. Business enrollments are 1,500 undergraduate students and 250 graduate students. The Neeley School has 43 full-time faculty members and is hiring 13 more over the next few years. The Department has ten and is hiring two. Send *curriculum vitae* and three letters of reference to Donald R. Nichols, School of Business, TCU Box 298530, Texas Christian University, Fort Worth, TX 76129; Email: d.nichols@tcu.edu. TCU is an EEO/AA Employer. Applications by women and minority candidates are especially encouraged.

458 CAL POLY, SAN LUIS OBISPO, seeks candidates for tenure-track position in Financial, Tax or Information Systems, beginning Fall 2000. Cal Poly, San Luis Obispo, is located in a charming college town on California's central coast. We have outstanding students, typically admitting one in ten applicants with average SAT scores of 1170. Forty-five percent of students accept positions with Big 5. Faculty have held leadership positions in AAA, AICPA, Cal Society, and IMA. Faculty publish in a wide range of journals. Doctorate required; professional certification preferred. Candidates must be committed to teaching excellence and professional development. Salary commensurate with qualifications. Closing: 11/30/99. Refer to Recruitment Code 03001. Contact Tad Miller, College of Business, Cal Poly, San Luis Obispo, CA 93407; (805) 756-1384; Fax (805) 756-6347. Cal Poly is strongly committed to achieving excellence through cultural diversity. The university actively encourages applications and nominations of women, persons of color, applicants with disabilities, and members of other underrepresented groups. AA/EEO.

459 UNIVERSITY OF CONNECTICUT anticipates accounting faculty openings at the Assistant/Associate level for Fall 2000 at both the Storrs campus and the Stamford campus. The position at Storrs is tenure-track. The position at Stamford is in-residence. Ability to teach in Accounting Information Systems and/or Financial Accounting is desirable. Candidates should hold an earned doctorate or be near completion. These positions extend the opportunity to teach at the undergraduate, M.S., M.B.A., and Ph.D. levels and engage in research in a supportive environment. The Storrs campus is located in an outstanding rural area, yet is convenient to several major Northeastern cities, including New York and Boston. The new Stamford downtown campus is located very close to New York City. Evidence of exceptional quality research and teaching performance are important. Contact Richard F. Kochanek, Accounting Department Head, University of Connecticut, U-Box 41A, 368 Fairfield Road, Storrs, CT 06269-2041; Email: dickk@sba.uconn.edu; Web site: www.sba.uconn.edu/accounting/index.html. We encourage applications from underrepresented groups, including minorities, women, and people with disabilities.

460 MOREHEAD STATE UNIVERSITY is seeking two tenure-track faculty members in Accounting at the Assistant Professor level beginning in August 2000. Teaching duties include 3-4 courses per semester of undergraduate and possibly graduate courses in accounting, including DL (Internet or CV) classes as needed. An expected load would include a mix of principles and upper-level Accounting courses. Scholarly activity leading to publication and professional service are expected. Qualifications: Doctorate in Accounting. ABDs that are close to completion will be considered. Desired Qualifications: Doctorate and previous training or experience in DL teaching will be given preference. For more information, contact Dr. Green Miller at (606) 783-2721 or by email at g.miller@morehead-st.edu. To apply, submit letter of application, *curriculum vitae*, official transcript(s), and references to Office of Human Resources, Attn: Acct.#291, Morehead State University, HM 101, Morehead, KY 40351. Review of applications will begin September 30, 1999 and will continue until filled. MSU is an EO/AA Employer.

461 BROCK UNIVERSITY, Department of Accounting and Finance, invites applications for a tenure-track position (Assistant or Associate level), starting July 1, 2000, and subject to final budgetary approval. Qualifications include: a doctorate in Accounting and a commitment to teaching (in any area) and research excellence. Brock University is on the scenic Niagara peninsula between Toronto and Buffalo, New York. A stable manufacturing base and growth in wine making, tourism, and horticulture provides for an exceptional range of opportunities. The Department offers both Bachelor of Accounting and B.B.A. degrees with co-op options. A Master's program begins in January 2000. Applications will be accepted until the position is filled. Send your application and *curriculum vitae* to Sandra Felton, Accounting and Finance, Brock University, St. Catharines, Ontario L2S 3A1. Email (preferred): sfelton@brocku.ca. We undertake positive action to reduce gender imbalance, and encourage qualified women candidates to apply.

Claremont
GRADUATE UNIVERSITY

FACULTY POSITION IN ACCOUNTING AND COST MANAGEMENT

Nominations and applications are invited for an anticipated faculty position in **Financial Accounting and Cost Management** in Claremont Graduate University's Peter F. Drucker Graduate School of Management. Appointment at the rank of associate or full professor is likely, but senior assistant professors with the requisite experience may be considered. The position includes responsibility for research and teaching at both the MBA and the Executive Management levels, and offers an opportunity to help lead the growing innovative Drucker School in its mission to advance the theory and practice of management.

Candidates must have a doctoral degree; a strong record of scholarship; an interest in diverse approaches, students and populations; and a demonstrated ability to make their intellectual contributions accessible to experienced managers through teaching and published work. Candidates also should have an interest in supervising the research of diverse students with considerable management experience. Executive level management or consulting experience is desirable.

These positions will remain open until filled. Review of nominations and applications, however, will commence on October 1, 1999. Please direct nominations, applications and inquiries to:

Office of the Dean
Peter F. Drucker Graduate School of Management
Claremont Graduate University
1021 North Dartmouth Avenue
Claremont, CA 91711

Located 35 miles east of Los Angeles in the foothills of the San Gabriel Mountains, Claremont Graduate University is enriched by its proximity to a diverse, multicultural business environment. Claremont Graduate University prepares a diverse group of outstanding individuals to assume leadership roles in the worldwide community through teaching, research, and practice in selected fields.

Claremont Graduate University is an Affirmative Action and Equal Opportunity Employer and actively seeks applications from women and members of minority groups.

For further information about the Peter F. Drucker Graduate School of Management, visit our website at: **www.drucker.cgu.edu.**

University of Alberta
Edmonton

CA Chair in Accounting

The Faculty of Business, University of Alberta, invites applications for the CA Chair in the Department of Accounting and Management Information Systems, effective on or after July 1, 2000. The chairholder will be an outstanding individual with expertise in financial accounting. He or she will have a distinguished research record, a strong teaching record, and a demonstrated interest in interacting with the business and professional community. Applicants should hold the rank of Professor, or should be eligible for the rank of Professor upon appointment. Competition remains open until the position is filled. The chairholder will be expected to provide intellectual leadership in the Department and Faculty in the study of financial accounting, as well as to strengthen the Department's and Faculty's links with the business and professional community. The Faculty encourages and rewards activity. In terms of research productivity and influence, the Department is one of the top two in Canada, and is in the top quintile of PhD-granting departments in North America. Further information about Edmonton, the Faculty of Business and the Department can be obtained at www.bus.ualberta.ca/.

Applications or inquiries should be directed to:

James C. Gaa, CA Chair Selection Committee
Department of Accounting and Management Information Systems
University of Alberta
Edmonton, Alberta, Canada T6G 2R6
Phone: (780) 492-3053
Fax: (780) 492-3325
E-mail: james.gaa@ualberta.ca

The University of Alberta is committed to the principle of equity in employment. As an employer, we welcome diversity in the workplace and encourage applications from all qualified women and men, including Aboriginal peoples, persons with disabilities, and members of visible minorities.

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Department of Accounting and Finance

Applicants should have a PhD in Accounting or Finance. For appointment to Associate Professorship, applicants should have 4-5 years' relevant experience as an Assistant Professor and a good track record in research and scholarly activities.

The appointee should be able to teach in at least one of the following areas: Financial Accounting, Auditing and Taxation and is expected to have a strong commitment to teaching excellence,quality research and services to the Department of the University.

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Associate Professor (Scale B)	HK$61,720 - HK$77,165 per month
Assistant Professor	HK$46,190 - HK$77,165 per month

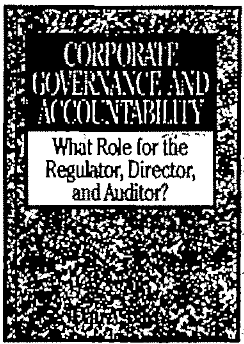
Fringe benefits include gratuity, medical and dental schemes, annual leave, local education allowance for dependent children, and where appropriate, housing allowance and passage and baggage allowances for the eligible appointee.

Application Procedures

Applicants are invited to submit (1) a detailed curriculum vitae, and the names, addresses and fax numbers/email addresses (if available) of three referees; or (2) an application form, which is obtainable from the University's homepage at http://www.ln.edu.hk, to the **Human Resources Office, Lingnan University, Tuen Mun, Hong Kong** by post, or by fax (852)-2891-5782, or by email: recruit@ln.edu.hk. Please specify the level of appointment for which you wish to apply and quote the reference number of the post on all correspondence.

The College reserves the right not to fill the post or to fill the post by invitation or by search.

Resources That Count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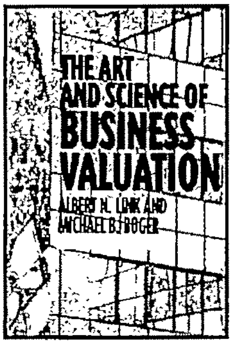
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ASSISTANT/ASSOCIATE PROFESSORS OF ACCOUNTANCY

MANAGERIAL & FINANCIAL ACCOUNTING

ACCOUNTING INFORMATION SYSTEMS

ASU West School of Management (SOM) is currently seeking tenure-track faculty members to teach courses at the undergraduate and MBA levels.

The SOM provides an excellent environment for high quality research and teaching. We offer state-of-the-art facilities and a standard teaching load of four courses per academic year. The SOM is especially attractive to scholars with an interest in interdisciplinary research and teaching.

A Bachelor's in Accountancy as well as a Postbaccalaureate Certificate in Accountancy are offered through the SOM. The Accountancy program is separately accredited by the AACSB. The B.S. in Global Business degree provides students with an opportunity to concentrate in information systems, marketing, financial management, human resource management, or international studies. Quality MBA students are attracted to the on-campus evening MBA program, as well as off-campus MBA programs such as The Scottsdale MBA, those offered at local corporations, and the weekend, web-based MBA. MBA students have the opportunity to participate in a dual degree program with Thunderbird (The American Graduate School of International Management) that allows them to graduate with both an MBA and MIM. The baccalaureate and MBA programs are accredited by the AACSB.

As part of the multi-campus vision of Arizona State University, ASU West serves nearly 5,000 junior, senior and graduate students in its modern, growing campus in northwest Phoenix. The full-service campus features a large resource library, state-of-the-art computer-linked classrooms and labs, and a full array of student services.

ASU West faculty are expected to be interested in integrating teaching and scholarship, interdisciplinary collaboration (joint appointments are encouraged), establishing community partnerships, and demonstrating a commitment to the importance of diversity.

Required Qualifications: Doctorate in Accountancy or related field by August 16, 2000; evidence of teaching effectiveness in accounting commensurate with level of appointment; evidence of experience in teaching financial or managerial accounting or accounting information systems; achievement in scholarship commensurate with level of appointment. Desired: Evidence of experience in and desire to teach a second area of accounting or managerial or systems accounting; evidence of funded research; experience in consulting/industry; evidence of web-based or on-line teaching.

Deadline: September 30, 1999 or the 30th of every month until the positions are filled.

Send: Two complete copies of a letter of interest, including course preference, vita, names, addresses and phone numbers of three professional references, evidence of teaching and research performance and of meeting desired qualifications to: **William A. Duncan, Accountancy Search Chair, ASU West School of Management, P.O. Box 37100, MC 2451, Phoenix, AZ 85069-7100. E-mail: william.duncan@asu.edu.**

AA/EOE.

ASU ARIZONA STATE UNIVERSITY WEST

POSITION ANNOUNCEMENT
ASSISTANT PROFESSOR OF ACCOUNTING
Rider University, Lawrenceville, NJ 08648

Rider University invites applications for the position of Assistant Professor of Accounting, commencing September 1, 2000. An earned doctorate in accounting is required; near-term ABDs will be considered. Professional certification is a plus. Position requires teaching in the cost/managerial or systems areas at the undergraduate and graduate (MBA, Macc) levels. Normal teaching load is 3 courses per term.

With a heritage dating to 1865, Rider University maintains campuses in Lawrenceville and Princeton, NJ, locations rich in tradition, culture and beauty. The College of Business Administration, centrally housed in a modern, award-winning facility, is AACSB accredited. The Accounting Department maintains active linkages with the professional community in the New York/Philadelphia corridor and emphasizes skills development and experiential learning in its programs. Visit the department's home page at the Rider University Web site: www.rider.edu.

Candidates with demonstrable skills as teachers and scholars should send an application letter, vita, and the names of three current references to **Rosemary Molloy, Manager of Employment, Human Resources, Rider University, 2083 Lawrenceville Rd., Lawrenceville, NJ 08648-3099.** Review of applications will begin immediately and continue until the position is filled.

Rider University is an equal opportunity/affirmative action employer and does not discriminate on the basis of age, race, sex, disability, sexual orientation, national origin, religion, or any other non-job related criteria.

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